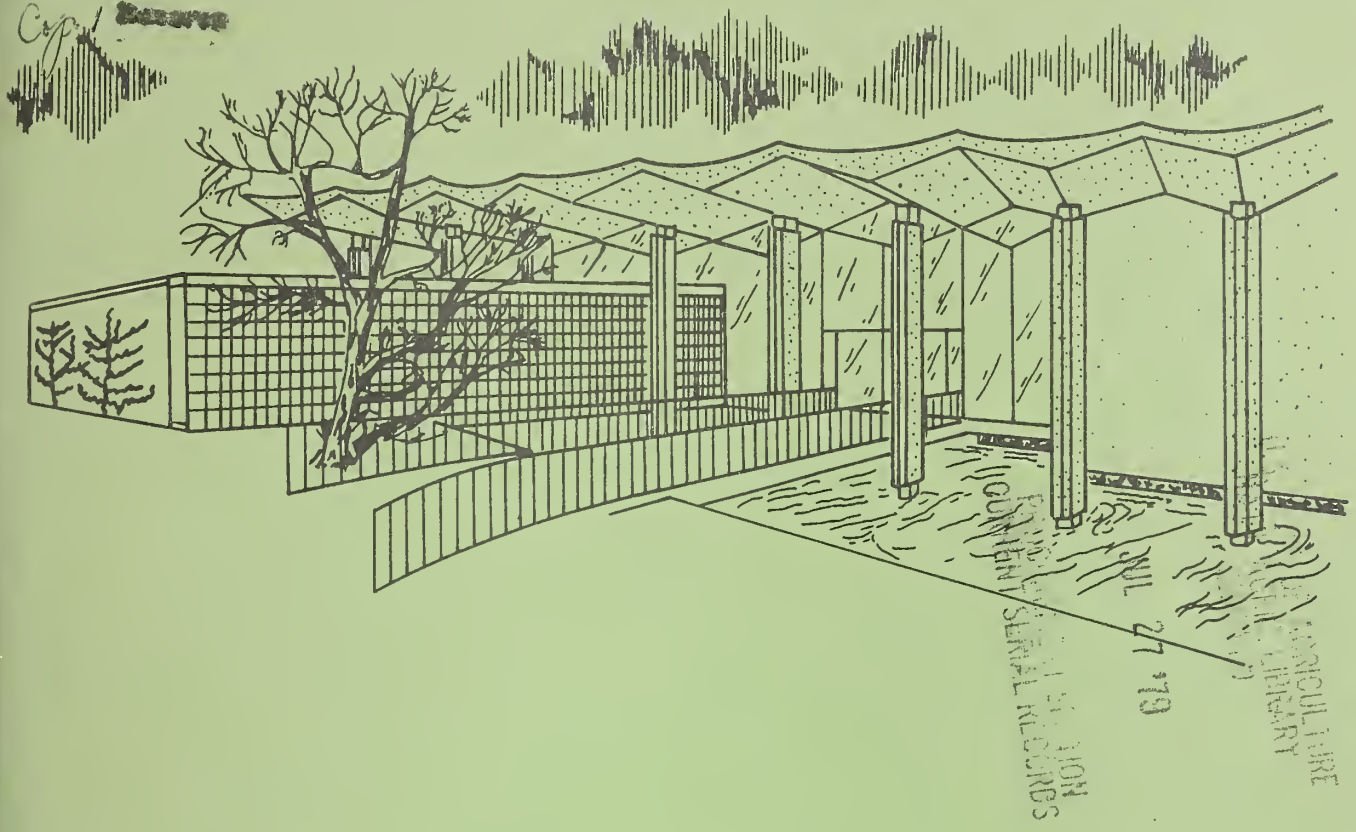

U.S. NATIONAL ARBORETUM

ANNUAL REPORT

1978

SCIENCE & EDUCATION ADMINISTRATION
U.S. DEPARTMENT OF AGRICULTURE
WASHINGTON, D.C.

U.S. National
Arboretum

U.S. DEPARTMENT OF AGRICULTURE
SCIENCE AND EDUCATION ADMINISTRATION
AGRICULTURAL RESEARCH
U.S. NATIONAL ARBORETUM

1978

DIRECTOR'S OFFICE
John L. Creech, Ph.D.; Director
Doris M. Thibodo; Secretary to the Director (Retired August 1978)
Gladys S. Richards; Secretary to the Director (Eff. December 1978)
Nancy M. Cronin; Budget and Personnel

FACILITIES AND MAINTENANCE
M. W. Scarborough; Manager
Thurman J. Dade; Maintenance Supervisor
Margaret E. Brady; Procurement

EDUCATION, INFORMATION AND LIBRARY
Erik A. Neumann, M.S.; Horticulturist, Curator of Education
Mary Ann Jarvis; Education Assistant
Jayne T. MacLean, M.S.; Librarian (Transf. to NAL, December 1978)
Ann Juneau, B.A.; Librarian (Eff. November 1978)

PLANT COLLECTIONS AND PLANT EXCHANGE
Sylvester G. March; Horticulturist
Vacancy; Plant Propagator
Loring I. Benedict, B.S.; Greenhouse and Gardens
Robert F. Drechsler, B.S.; Curator, Bonsai Collection
Robert F. Doren, B.S.; Curator, Gotelli Conifer Collection
Ronald L. Bare, B.S.; Curator, Azalea-Rhododendron Collection
Ernest J. Luskey; Curator, Camellia Collection
Lynn R. Batdorf, Curator, Boxwood-Daylily Collection
Craig T. Keys; Gardener-in-Charge, Fern Valley
Albert L. Brown; Gardener-in-Charge, Dogwood Collection
Robert Woodard; Gardener-in-Charge, Administration Building Gardens
Junior A. Peterson; Maintenance Gardener
Moses J. Bishop; Plant Labeling and Signs

ARBORETUM RESEARCH
Nomenclature and Taxonomy of Cultivated Plants
Frederick G. Meyer, Ph.D.; Taxonomist, Curator, Arboretum Herbarium
Theodore R. Dudley, Ph.D.; Taxonomist, Curator of Type Collections
Roland M. Jefferson, B.S.; Botanist
Peter M. Mazzeo, B.S.; Botanist
James McClammer, M.S.; Herbarium Assistant

ARBORETUM RESEARCH

Cytogenetics, Breeding and Evaluation of Shade Trees

Frank S. Santamour, Jr., Ph.D.; Research Geneticist
Gene K. Eisenbeiss, B.S.; Horticulturist
Harold E. Vettel, B.S.; Biological Technician (Biochemistry)

Cytogenetics, Breeding and Evaluation of Ornamental Shrubs

Donald R. Egolf, Ph.D.; Research Geneticist
Anne O. Andrick; Research Technician

Ornamental Introduction, Evaluation and Development

William L. Ackerman, Ph.D.; Research Horticulturist
Margot Williams, M.S.; Horticulturist

Plant Introduction Station, Glenn Dale, Maryland

Howard E. Waterworth, Ph.D.; Virologist

COOPERATIVE SERVICES

National Capital Area Federation of Garden Clubs, Inc.

Mrs. Edward W. Geer, Jr.; President
Mrs. Gilbert Tracy; Manager, Federation Hqtrs. and Garden Center
Mrs. Judson C. French; Chairman, Guide Service
Mrs. Paul Adams; Activity Center Gift Shop

Friends of the National Arboretum

Frank P. Cullinan, Ph.D.; Trustee
Mrs. Benjamin A. Powell; Trustee
Henry T. Skinner, Ph.D.; Trustee

Arboretum Collaborator

Henry T. Skinner, Ph.D.

NATIONAL ARBORETUM ADVISORY COUNCIL
July 1976 - July 1978*

Mr. William Flemer, III, Chairman
Princeton, New Jersey

Dr. John P. Mahlstede, Vice Chairman
Ames, Iowa

Dr. H. O. Graumann, Executive Secretary
U.S. Department of Agriculture, Washington, D.C.

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Dr. James K. DeVore
Oklahoma City, Oklahoma

Mrs. Ray W. Lauchis
Lawai, Hawaii

Mr. Alfred S. Martin
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Mr. R. Henry Norweb, Jr.
Mentor, Ohio

Mrs. Benjamin A. Powell
Chevy Chase, Maryland

Mrs. Edward W. C. Russell
Landrum, South Carolina

Mr. Hideo Sasaki
Watertown, Massachusetts

Dr. Richard P. White
Silver Spring, Maryland

Dr. Fred B. Widmoyer
Las Cruces, New Mexico

Mr. John B. Wight, Jr.
Cairo, Georgia

*The National Arboretum Advisory Council was reestablished by Secretary of Agriculture, Bob Bergland, by Secretary's Memorandum No. 1849, Revised, dated October 2, 1978.

REPORT OF THE U.S. NATIONAL ARBORETUM
for the period January - December 1978

prepared for the meeting of the
Advisory Council
June 13-14, 1979

INTRODUCTION

The Year 1978 was an active one for the U.S. National Arboretum in progress in research and education and in the development of facilities. As may be seen from the individual reports, each of our scientific units has reported several exciting developments. As a consequence, it is difficult to single out those for specific mention.

In the botanical area, Dr. Meyer's long-range project on documentation and identification of trees, shrubs, and woody vines of the southeastern United States is unprecedented and over 5,500 herbarium specimens have been collected and deposited in the National Arboretum Herbarium. It is important to emphasize that no comparable collection exists for this significant cultivated plant region. New taxonomic and nomenclatorial treatises of cultivated Ilex by Dudley and Eisenbeiss expand our understanding of this important group of nursery plants.

In the shrub breeding program, Dr. Egolf has added two new disease resistant Pyracanthas to the already world-acclaimed 'Mohave'. These are 'Navaho' and 'Teton'. Dr. Egolf and Anne Andrick prepared the Lagerstroemia Handbook/Checklist, published by the American Association of Botanical Gardens and Arboreta. Dr. Santamour has initiated research on the inheritance of wound compartmentalization as a means of seeking out individual trees that might be genetically superior in ability to withstand the impact of wounding, so common an occurrence among street trees.

The discovery that Camellia oleifera has exceptional hardiness when compared to C. sasanqua has created new options for Dr. Ackerman's camellia breeding program.

In a joint horticultural/botanical collecting trip, Creech, Meyer, and March explored remote off-shore Japanese islands, collecting over 850 living and pressed plants. This exploration was supported to a large part by funds from the Research and Exploration Committee of the National Geographic Society.

The growth of the living collections was enhanced in the Cryptomeria valley ravines by two handsome benches and stone walls together with new plantings. This feature has brought highest praise from many visitors. The sturdy benches designed by Sasaki Associates and implemented by our own shops people under Mr. Scarborough came from a fallen Arboretum white oak. This new feature carries out the theme of incorporating a broad array of Japanese plants into this very amenable setting as was conceived by the first Director of the National Arboretum, B. Y. Morrison.

Education programs included classroom teaching by several staff members on subjects ranging from bonsai to plant propagation. A most popular production is the National Arboretum Poster conceived and initiated by Eric Neumann and produced by the Science and Education Administration, USDA.

A noteworthy achievement is that the Herb Society of America attained its goal of acquiring funds for the National Herb Garden by reaching close to $300,000 in contributions and encouraged an additional counterpart funding of $200,000 by Congressional action. In December 1978, the HSA presented Secretary Bergland with a check for $200,000. The actual groundbreaking for the National Herb Garden took place in November, 1978, with work initiated by Bill Scarborough and Arboretum staff.

We can look with a great deal of pride at the dedication of Professional staff, whose accomplishments are readily identified. It is also important to recognize the many dedicated Arboretum employees who derive satisfaction mainly from their less obvious contributions but which are reflected in the great enjoyment of the public in their visits to the Arboretum. This includes the several contributory organizations and plant societies who by their excellent shows and in many other ways give essential support to our total program.

We can regard these concrete examples of progress as evidence of the great potentials that lie in the future of the National Arboretum. It is equally important to emphasize that the current progress has been accomplished within strict financial and manpower constraints. The National Arboretum is unique in that as a function of a research organization, education and public activities remain in a markedly subordinate situation. The National Arboretum occupies 444 acres of prime land in the National Capital and is attracting an ever increasing audience of the plant conscious public, both local and from around the country. We are taxing our facilities to the limit in education and ability to serve the visiting public.

The Master Plan for the U.S. National Arboretum was designed to meet the growth need over the next 20 years. This document was submitted to the National Capital Planning Commission in August, 1978, for consideration and approval. Followed in its broad outline, the Master Plan will guide the Department in its management of the Arboretum toward achieving new and rewarding goals and place the Arboretum in its rightful position as the "Nation's Garden."

ARBORETUM ADMINISTRATION

A. Organization

The Department of Agriculture completed the appointments under Dr. M. Rupert Cutler, Assistant Secretary for Conservation, Research, and Education, for leadership in the Science and Education Administration. Dr. Anson R. Bertrand is Director, Science and Education, Dr. Ralph J. McCracken is Associate Director, SEA. The line of authority is through Mr. T. W. Edminster, Deputy Director, Agricultural Research (SEA) to Dr. Steven C. King, Regional Administrator, Northeastern Region. The National Arboretum is a unit of the Northeastern Region.

B. Operating Plan Budgets

The initial FY 1978 Operating Plan Budget for salaries and support services was $1,589,500. This was increased during the year by $116,500 to cover such costs as increased energy costs, supplies and materials, emergency repair and maintenance situations, and replacement of aged equipment.

The initial FY 1979 Operating Plan Budget was $1,695,700 for regular funds. Under a special repair and maintenance program, the Arboretum received an initial $140,000 for repair and maintenance activities. In addition, the National Arboretum received $90,200 to support the Youth Conservation Corps and Young Adult Conservation Corps programs. Under the National Arboretum Gift Act, $266,413 was contributed in Calendar Year 1978 for specific purposes, the major contributions being a bequeath of $50,000 for Dr. Egolf's shrub research program, $200,000 for construction of the National Herb Garden, and $14,000 for the Japan Plant Exploration.

C. Developmental Activities

Progress continues towards the completion of the range of plastic greenhouses. The five main research houses (96' x 26') have been erected and the two additional ones assembled from the old houses are essentially finished. All are in use even though heating and irrigation has yet to be fully accomplished.

Funds have been provided in the 1979 budget for the first phase of a 3-year road repair program. The first phase will be to resurface the badly eroded roads around the greenhouses and down towards the shops, plus temporary patching of deep holes elsewhere in

the road net. In addition, funding for repair and maintenance activities has allowed for repainting the interior of the Administration Building. The outdoor restrooms will be thoroughly renovated and heaters installed so they may be operated on a year-around basis.

The Administration Building pool was repaired and resurfaced during the annual spring cleaning and should now last for several more years. In addition, repairs to the roof of the Administration Building which has plagued us constantly have been funded.

The Master Plan for the National Arboretum was completed by Sasaki Associates on July 31, 1978, and accepted by the Department in August, 1978. It has been submitted to the National Capital Planning Commission. The plan is consistent with the Development Concepts approved by the Commission on August 12, 1976 and has been reviewed by all impacted federal and city agencies. Final action awaits completion of the Section 106 of the Historic Preservation review process.

National Arboretum Gift Act - It is now possible to see tangible evidence of the success of the NAGA as a source of private funds to support Arboretum activities. Funds and other private donations are tax deductible under this Act. Among the major contributions received under the Gift Act was $200,000 from the Herb Society of America for the National Herb Garden, an estate bequeath of $50,000 to support shrub research, and $14,000 to support the Japan Plant Exploration, largely from the National Geographic Society.

We continue to receive support through the Friends of the National Arboretum used mainly for the purchase of rare plants, library accessions, garden benches, bonsai tables and similar items. The total fund contributed to the Friends from many sources in 1978 was $6,465.09 and $10,646.87. The balance at the end of December, 1978 was $12,580.85. Trustees for the Friends of the National Arboretum are Dr. Frank P. Cullinan, Dr. Henry T. Skinner and Elizabeth Powell. Dr. Richard P. White is Auditor.

The construction of the National Herb Garden commenced with rough grading undertaken by Mr. Scarborough and his crew. At the same time, data collection sheets to tabulate and describe the several thousand known herbs was completed by the SEA Data Systems Application Division in cooperation with the NA and HSA. The HSA will use these forms to provide plant data for eventual computerization of the information. From this material, the herbs to be planted in specialty gardens will be derived.

Two other gardens which have been incorporated into the Master Plan projections are the Deciduous Shrub Garden (Plants in the Landscape) and the Bird Garden, a development near Fern Valley that would provide for birds, including public education on how to provide natural food supply and protection. A preliminary plan is on file for the Shrub Garden. There are no immediate plans to implement the construction of either garden. Similarly, the site for the Braille Trail has been selected but awaits action.

D. Personnel Operations

The personnel strength of the Arboretum, including staff assigned to the Glenn Dale facility remained at 80 full and part-time positions and student employees. In addition, there are 15 YCC and 27 YACC employees.

Training opportunities were afforded 19 Arboretum employees ranging from seminars to college level courses aimed at improving work skills. The most intensive training was that taken by Sherrill Sasser in Basic Cartography at the Fort Belvoir Defense Mapping School.

Two employees received top outside awards. Dr. Frederick Meyer received the Gold Seal Award of the National Council of State Garden Clubs in recognition of his outstanding botanical accomplishments of international scope. Mr. Sylvester March was awarded the American Horticultural Society's Scientific Citation "for his outstanding contributions to Scientific Horticulture".

Mr. Joe Lusky was given a cash award from SEA in recognition of his dedicated activity in developing programs to assist individuals afflicted with alcoholism, drug, and emotional problems.

E. Facilities

There have been a number of improvements in Arboretum facilities. Following are the major items which have either been completed, or for which contracts have been placed.

1. New irrigation and water line. Seven plastic greenhouses---------- $ 12,399
2. Water Proofing Pool around the Administration Building---------- 12,000
3. Refurbishing all interior surfaces in Administration Building (Painting, Wall Papering and reoiling of Cherry Paneling) ---------- 33,000
4. Specification and Contracts in process of resurfacing approximately 1/3 of the Arboretum's hard surface road including main parking lot around Administration building---------- 100,000
5. Refurbishing both outside comfort stations-------- 16,800
6. Reroofing main Administration Building and Herbarium---------- 35,000

7. Repairing or replacing all doors to buildings within the National Arboretum ---------- $ 5,000

Vehicles and Heavy Equipment. The Arboretum has acquired two new vehicles through the YACC Program which consist of one twelve passenger van and one six passenger pickup truck.---- 16,000
In addition, a John Deere 450-C Crawler loader was purchased with funds from NER---------- 18,847

Security. The contract guard system for nonoperating hours plus our regular Arboretum daytime guard force now provides for 24-hour security. This is supplemented by the routine patrol of the Metropolitan police force.

The new closing hour of 5:00 p.m. daily has been in effect for a year and has presented no problems. No major crimes have occurred in the Arboretum during the year, but we continue to be plagued by car vandalism.

Safety. The program to upgrade the health and safety of the Arboretum employees and the public improves steadily. A Safety Committee functions under chairmanship of Mr. Craig Keyes. Regular committee inspections identify hazards and other safety-related issues. Training in CPR and First Aid for some 20 people is planned. Films were shown on safety and health and new employees given a safety orientation. Hard-hats and goggles have been provided to all employees and supervisors have been instructed in the need for caution in the use of potentially hazardous equipment.

F. U.S. National Arboretum Weather - 1978

Total precipitation in 1978 was 41.36", 3-1/3" above the 1977 total of 38.03", yet considerably below the 10-year average (1968-1977) of 46.53". January 1978 proved to be the wettest January on record with five major storms and a total precipitation of 7.58": followed by an extremely dry February with only .33", all in the form of snow. April also was extremely dry; although rain was recorded on 9 days, total accumulation was only 1.38". September 1978, as in 1977, was extremely dry with only .97" precipitation.

Average seasonal snowfall at the Arboretum is 20". In 1978, we recorded 21.8", all in the months of January-February-March, with just a trace in November.

Severe thunderstorms and high winds occurred in the summer, with particularly severe storms on June 26-27, July 2-3, and July 31-August 1. A major hailstorm occurred on July 10.

Temperature ranges were less extreme in 1978 with a high of 98° F. and a low of 10 F., as compared with 101 F. and -1 F. in 1977. The 10-year averages (1968-1977) were 97 F. and 6.5 F. Daytime temperatures dropped below freezing only 14 times from January 1 to March 11; however, nighttime temperatures rose above freezing only 3 times in the same period, resulting in a much longer cold period than in 1977. There was a period of 12 days (January 28-February 9) when temperatures never rose above freezing. In 1978, the last 32 F. freeze in the spring occurred on the night of March 18, and the first in the fall on November 8. Average dates are April 12 and October 31.

G. Plant Patents

Through the Patent and Trademark office of the U.S. Department of Commerce, the National Arboretum has been involved for many years in the processing of plant patent applications and accessing the novelty of the plants for which patent protection is sought. Through the herbarium, close cooperation with the plant patent office is maintained with Robert E. Bagwill, patent examiner. The National Arboretum maintains the only complete reference file of plant patents outside the Patent Office. The file now includes 4,389 plant patents. This extremely valuable reference file is a complete record of all plant patents issued in this country since the first patent was issued on August 18, 1931, for a rose plant. The plant patent is a valuable reference file and is often consulted by Arboretum personnel doing plant breeding research, as well as outsiders. As issued, copies of all plant patents are sent to the Arboretum and filed numerically in vertical files in a special place in the herbarium. They are curated by Mrs. Barbara Carr of the herbarium office. An alphabetical cross-reference card file by genus and cultivar name is maintained for quick reference.

PLANTS, PLANTINGS, AND HORTICULTURE

A. Plant Records, Mapping, Graphics, and Labeling (R. M. Jefferson)

From January 1978 through December 1978, the following accomplishments are noted:

- --2,074 plants, seeds, scions and cuttings were accessioned.
- --Approximately 1,630 new record and display labels were added to, or replaced, in various plant collections throughout the Arboretum.
- --Roland Jefferson visited various Arboreta and Botanical Gardens in Europe to observe record keeping and display labeling techniques.
- --During the Fall of 1978, Sherrill Sasser attended the Basic Cartography course which is offered by the Defense Mapping School at Fort Belvoir, Virginia. This course provided basic skills and knowledge in modern mapping practices.
- --Inventories and plant location maps were completed for the Holly Area and records have been updated for the remainder of the Gotelli Collection. Preparations are underway for mapping the Daffodil Collection in Fern Valley.

B. Plant Collections (S. G. March)

Azalea-Rhododendron Collection. Considerable improvement has been made in the main terrace of the Rhododendron-Azalea Collection. This has been accomplished through the efforts of Mr. Ronald Bare, Curator and his staff along with additional manpower provided by the YACC Program. With this additional manpower previously neglected areas such as the Azalea Valley are in the process of rejuvenation. Much progress has been made in the control and eradication of honeysuckle and grape vines on the Azalea Hillside. Over half of the azaleas in the Azalea Loop west of the Morrison Garden have been replanted under more favorable growing conditions. In addition, considerable work has been done to improve the trails in this area.

An inventory of all evergreen azaleas has been made. The task of maintaining a complete inventory of the Glenn Dale Azaleas continues through contacts with collectors and growers. Significant azalea acquisitions include 27 cultivars of the Robin Hill Azaleas from Mr. Robert Gantnell, Wyckoff, New Jersey, the originator; 36 cultivars of Satsuki Azaleas from Mrs. Gladys Wheeldon, Gladsgay Gardens, Richmond, Virginia; and 25 cultivars of the Linwood Hardy Azaleas from Fischer Greenhouses of Linwood, New Jersey.

Bonsai Collection. The National Bonsai Collection continues to be a major visitor attraction. Due to the great diversity of species represented in the collection, an everchanging sight awaits the visitor. It is not unusual for local enthusiasts to visit the collection monthly. Among the visitors to the collection this past year was Mr. Nobusuko Kishi, former Prime Minister of Japan and President of the

Nippon Bonsai Association. Mr. Kishi officiated at the presentation ceremonies at the Bonsai Collection in Tokyo in March 1975. Also visiting the Collection were Prince and Princess Hitachi. The Prince is Emperor Hirohito's second son. Several of the bonsai donors have visited the Collection.

The bonsai are all in good condition. Most were repotted during the spring. Much credit for the high level of maintenance in the Japanese Garden and Bonsai Area is given to Ms. Margot Osborne and Ms. Mildred Wood, a student employee. We are most fortunate in having the volunteer services of two expert amateur bonsai specialists, Ms. Ruth Lamanna and this past year Ms. Janet Lanmar. Ms. Lamanna has been assisting with the care of the bonsai since they arrived in 1975, contributing many hours of dedicated work and advice.

Several groups of woody plants that are used for bonsai have been started for testing various soil types, fertilizers and watering methods for bonsai culture. Chrysanthemums and Satsuki azaleas are two plant groups that are used for specialized bonsai. In Japan, Bonsai, Satsuki azalea, and Chrysanthemum shows are held at flowering times. We have started to assemble a small collection of both of these plants for training as bonsai. The initial trial with chrysanthemums has been most successful.

Boxwood, Daylily, and Peony Collections. A major planting of 18 boxwood cultivars has been added to the collecting in the way of an entrance planting at the main road to the Collection. Daylily and peony plants were added to give color during the spring and summer months.

The reorganization, replanting and remapping of the daylily collection has been completed. All of the 28 Stout Medal winners have been assembled and planted together according to height, color and time of bloom. The Donn Fischer Memorial Cup Winners Collection is planted in a similar fashion. A special collection of the 20 most popular cultivars as selected annually by the American Hemerocallis Society membership is featured. A planting of tetraploid cultivars reflects the current trend in daylily breeding. Forty-five new additions have been added to the general collection during the past year, most of which have been received as donations from collectors and hybridizers. Presently, over 300 cultivars are represented. Efforts continue in the acquisition of authentic Hemerocallis species. Presently, 18 species out of 23 known species are represented in the collection. Requests continue to be received from hybridizers for material from our species collection for use in breeding.

Twelve plants representing Japanese, European and lutea hybrids have been added to the tree peony collection. Ten herbaceous peonies have also been added.

Camellia and Garden Club of America Plantings. Renovation and rejuvenation of the Camellia Area continues as a response to the severe winters of 1977 and 1978. Replanting has begun with camellias and other select plants native to Japan. It is envisioned that the entire area will be revitalized over the next several years. The basic plantings of cryptomerias, pines, and hardwoods will serve as an excellent foundation for the new plantings.

The overlook areas adjacent to the Garden Club of America Area have been completed. Two attractive benches have been fashioned by Arboretum carpenter, Mr. Robert Faltynski, from a fallen Arboretum White Oak. Initial planting of the overlook area and connecting pathway has begun with completion expected in Spring of 1979. The new pathway and overlook areas afford the visitor an opportunity to enjoy a quiet moment in this pleasant setting.

Fern Valley and Daffodil-Ivy Planting. Twenty-six accessions of daffodils including miniatures and species were added to the Collection. These included cultivars of American origin. As new cultivars gain acceptance as indicated by the American Daffodil Society's Annual National Survey, they will be added to the Collection.

Through separate donations, three teakwood benches have been placed in the daffodil planting. These are the first benches in the area and provide visitors the opportunity to stop and enjoy the surrounding tranquil beauty. Near the benches additional plantings of ferns, wildflowers and native shrubs, as well as daffodils, have been added.

Wildflower plants from several commercial sources and plants grown from locally collected seed have been added to the Fern Valley Collection of native plants. The addition of plant material to the Valley is an ongoing project. In collaboration with Mr. Peter Mazzeo of our herbarium staff, a master listing of native Eastern U.S. fern species suitable for cultivation in Washington has been developed. Acquisition of these species not already in the Valley has begun.

The Arboretum participated in the Youth Conservation Corps program for the third summer in 1978. As in the past, the major center of work activity was in Fern Valley and the Daffodil-Ivy Planting. Renovation of existing plantings and additional new plantings were made. Low 12-18-inch stone and post "barriers" have been added along the stream pathways to discourage visitors from trampling fern and wildflower plantings along the stream. Such "barriers" installed in 1977 have proven an effective yet unobtrusive way to give the plantings along the stream edge some protection. The Corps also cleared the Fern Valley stream of debris, placed stone walls along the stream bank to prevent erosion and renovated the lower pond.

The purpose of the Federally funded YCC program is to further the development and maintenance of the natural resources of the United States by employing young men and women to work on conservation projects in the healthful outdoor atmosphere of the National Park System, the National Forest System, and other public land and water areas of the nation.

The objectives of the program are to provide gainful employment of America's youth, ages 15 through 18, during the summer months in a healthful outdoor atmosphere, an opportunity for an understanding and appreciation of the Nation's natural environment and heritage and to further the development and maintenance of the natural resources of the United States by the youth who will ultimately be responsible for maintaining and managing these resources for the American people.

In 1978, our camp numbered 15 youth from the District of Columbia, our camp Director, Ms. Stella Koch, a local science teacher, and an assistant, Mr. Dan Chiplas, a recent graduate in horticulture from Purdue University, directed the program.

The YCC has made a noteworthy contribution to the Arboretum and we feel the Arboretum has in turn served as an ideal site and experience for the YCC enrollees. Mr. Sylvester G. March serves as overall camp coordinator; Mr. Craig Keys provides on site technical support.

Gotelli Conifer Collection. Mr. Robert F. Doren, Curator, resigned in December 1978 to enter private business in Florida.

Three educational plantings of conifers were developed. One at the west end of the Administration Building comprising 12 of the "best" and most readily available "dwarf conifers" for the Washington area. This planting is also repeated opposite the entrance to the Gotelli Collection along with a planting of the 12 "best" and most readily available prostrate junipers for the Washington area. Twenty-six of these plantings were donated by the Behnke Nurseries Company, Beltsville, Maryland.

Of special significance is the donation by Donald P. and Hazel Smith of their collection of dwarf pine cultivars. Over 50 cultivars of a broad range of species are represented in the collection. Plants range from 4 to 16 years in age. The Smith's own and operate the well-known Watnog Nursery in Morris Plains, New Jersey, specializing in dwarf conifers and unusual broad-leaved evergreens. The collection will be moved to the Arboretum in March of 1979. A gently sloping hillside near the Gotelli Collection and adjacent to conifer parking area has been selected as the planting site. The collection represents an important segment of the variability that exists in the genus Pinus and is a valuable addition to our collections.

C. Plant and Seed Distribution Programs, 1978

Domestic Plant Distribution	
Number of participating arboreta, botanic gardens and research institutions	240
Number of institutions requesting plants	152
Number of items available for distribution	35
Number of plants sent	11,143
Commercial Plant Distribution	
Number of participating nurserymen	40
Number of nurseries requesting plants	31
Number of items available for distribution	5
Number of plants sent	763
Formal Overseas Seed Exchange - Index Seminum	
Number of arboreta, botanic gardens and research institutions participating	240
Number of institutions requesting seed	117
Number of items available	376
Number of seed packets sent	4,815
Special Overseas Distribution - North American Plants	
Number of arboreta, botanic gardens and research institutions participating	72
Number of institutions requesting plants	31
Number of items available for distribution	3
Number of plants sent	178
Special World-Wide Distribution - NA Introduction Ilex X 'Sparkleberry' and X 'Apollo'	
Number of arboreta, botanic gardens and research institutions participating	312
Number of institutions requesting plants	118
Number of plants sent	297
Special Limited Commercial Distribution Camellia japonica 'Frost Queen'	
Number of nurseries participating	6
Number plants sent	18
Special Requests - World-Wide for Plant Material from NA Collections	
Number of requests for plants	116
Number of plants sent	5,016
Number of requests for seed	19
Number of seed packets sent	90
Number of requests for cuttings/scions/divisions	68
Number of cuttings/scions/divisions sent	4,176

Total Number of Plants/Cuttings/Scions/Divisions/
Seed Packets Shipped

Plants	17,415
Cuttings/scions/divisions	4,176
Seed Packets	4,905
Total Number of Shipments	658

Selected examples of the above listed requests include: Cuttings of 13 Cotoneaster species and cultivars to Mr. Peter J. Pelofske, University of Idaho, Moscow, Idaho, for use in research project with the genus; plants of Cephalotaxus harringtonia and C. h. 'Fastigiata' to Dr. James Duke, Economics Botany, SEA, Beltsville, Maryland, for cancer screening program; leaves of Zizyphus jujuba to Mr. Ronald C. Yarger, General Foods Central Research Department, White Plains, New York, for sweetness research--compound reported to be in Zizyphus leaves that suppresses the sweet taste of many substances for up to five minutes; cut branches of 20 Ilex aquifolium and I. opaca cultivars to Mrs. Cragwell for the National Capital Area Federation of Garden Clubs Judging Symposium, Washington, D.C.; cuttings of X Cupressocyparis leylandii 'Green Spire' to Mr. M. McCrary, Soil Conservation Service, Beltsville, Maryland, for testing as a wind break plant; cuttings of 17 Beltsville Dwarf Azalea cultivars to Mr. Bob Carlson, Carlson's Gardens, South Salem, New York, for reintroduction into nursery trade; seed of Vitis aestivalis var. argentifolia to Prof. Dr. Becker, Forschungsantalt fur Weinbau, Gardenbau, Getrunketchnologie und Landspflege, Geisenbheim am Rhein, West Germany, for use in wine grape research; plants of Rhododendron yakusimanum to Dr. David Nielsen, Ohio Agricultural Research and Development Center, Wooster, Ohio, for use in studies on the control of Black Vine Weevil, Otlorhynchus sulcathus; plants of 13 American fern species to Mr. Walder Vandenberg, Society Royal de Zoologie D'Anvers, Antwerp, Belgium, for adding to their plant collections; seed of Maclura pomifera to National Blood Transfusion Service, Lancaster Center, Lancaster, England, for testing lectin content in MNS blood group system studies.

D. Plant Acquisitions (some significant donations/purchases)

Cuttings of 6 Hedera helix cultivars from Mr. W. O. Freeland, Columbia, South Carolina; plants of 4 Hemerocallis species from Mr. Charles Erskin, Royal Botanic Garden, Kew, England; plants of 11 bonsai Chrysanthemum cultivars from Mr. R. Edwin Edelen, Bethesda, Maryland; plants of 17 Rhododendron species from the Rhododendron Species Foundation, Federal Way, Washington; plants of 5 Ilex crenata cultivars from Princeton Nurseries, Princeton, New Jersey, through the American Association of Nurserymen to be used in a demonstration planting of the best and most readily available I. c. cultivars; plants of 17 Ilex opaca cultivars from Mr. William N. Kuhl, McLean Nurseries, Baltimore, Maryland, some of which are to be used in a demonstration planting of the best and most readily available I. opaca

cultivars; plants of 19 woody plant collections from the Arnold Arboretum's plant exploration to Japan and Korea; plants of 21 peony cultivars from Louis Smirnon, Brookville, New York; bulbs of 13 Narcissus cultivars from Grant E. Mitch, Hubbard, Oregon.

E. Special Items

Nagoya Flower Show

The National Arboretum participated in the Second Annual Nagoya Flower Show, Nagoya, Japan, in April 1978. The show is attended by over 150,000 people and sponsored by the Chunichi Newspaper, Nagoya Botanical Garden, and the Chunichi Horticultural Society with assistance from Japan Airlines. The Arboretum exhibit was of flowering branches of the so-called "Girl Magnolia" hybrids developed at the Arboretum by William Kosar. These hybrids between Magnolia liliflora 'Nigra' X M. stellata 'Rosea' and M. liliflora 'Reflorescens' X M. stellata 'Rosea' are notable for their flowering after the danger of frost and strong purple flower color. Cultivars include 'Ann,' 'Betty,' 'Judy,' 'Randy,' 'Ricki,' 'Susan,' 'Jane,' and 'Pinkie.' The hybrids are gaining popularity in Japan. Takii Seed Company has a feature article on them with color photographs in their current catalog.

YACC

The Young Adult Conservation Corps (YACC) was established by Congress, Public Law 95-93, in August 1977. The Corps is administered by the Department of Labor through the Departments of Agriculture and Interior. The objectives of the program are to give meaningful employment in Federal, state and local governments to unemployed young adults between the ages of 16 through 23, regardless of social, economic and racial classifications and to accomplish needed conservation work on public lands. Enrollees may stay in the program for up to one year and are paid the minimum wage. Funding for enrollee salaries and support material is provided by a special appropriation to the Arboretum. In the spring of 1978, the Arboretum was invited to participate in the Northeastern Region, SEA YACC program along with the Beltsville Agricultural Research Center and Plum Island Animal Disease Center. The nonresidential camp at the Arboretum started on June 12, 1978 with 35 enrollees assigned to a broad array of units at the Arboretum including the Director's Office, the Education Office, Library, Greenhouse, Herbarium, Plant Records, Shade Tree Breeding Project, Shrub Breeding Project, and with the various plant collection curators and shops maintenance departments. Enrollees are recruited from the local unemployment offices. During an enrollee's tour of duty, he is encouraged to find permanent employment. Since the start of our program, 50 percent have left for permanent employment or to continue their education; 50 percent have left for medical or disciplinary reasons. Hiring to maintain the allotted manhours is a continuous process.

The YACC Program has been of an overall benefit to the National Arboretum in providing much needed manpower to our administrative, research, education, horticulture, and facilities maintenance program. Sylvester G. March serves as Camp Director, Lynn R. Batdorf, Assistant Camp Director.

F. Plant Exploration in Japan

A plant exploration was initiated in Japan on October 1, 1978, and concluded on December 9, 1978. Team members of the U.S. National Arboretum were Dr. John L. Creech, Director; Dr. Frederick G. Meyer, Research Botanist; and Mr. Sylvester G. March, Horticulturist. Drs. Creech and Meyer were supported with funds from the National Geographic Society and Mr. March traveled on funds provided by the Science and Education Administration, USDA.

The purpose of the exploration was to collect wild plants of western Japan with particular attention to remote areas along the Japan Sea, including Toyama, Noto, Oki Islands, Tottori, Tsushima, and the Goto Islands. In addition, the cape region of Nagasaki Prefecture and Taradake plus small volcanic cones of central Kyushu were visited because of unique woody plant communities. Cultivated forms of Japanese species were collected as they are important aspects of the use of Japanese plants in the United States. In support of the documentation of the living collections and to expand our knowledge of the flora of Japan, herbarium vouchers were collected for study and deposition in the National Arboretum Herbarium. An added effort was the preparation of meristem tissue cultures under non-sterile field conditions to observe the extent to which this technique might be employed during plant collecting activities.

The field work was conducted with the cooperation of the Forestry Agency of the Japanese Ministry of Agriculture, Forestry, and Fisheries, the University of Tokyo Botanic Garden, the Vegetable and Horticultural Research Station (MAFF), Kurume, and the Prefectural Governments of Toyama, Ishikawa, Tottori, and Nagasaki. The Agricultural Attache's office, American Embassy, provided much assistance in receiving and shipping plant collections.

The team rented a small van in Tokyo to be used throughout the field work. This was necessary because of the volume of supplies and collecting equipment required for a joint botanical/horticultural activity. While this practice of driving such great distances in Japan is unusual, it was instrumental in the great success of the exploration. The team drove 3,568 kilometers from Tokyo to Nagasaki and return. At each main collecting locality, local field transportation suitable for rough terrain was provided.

The entire plant exploration was a success. 848 living collections of seeds, plants, and cuttings were made and 750 herbarium specimens usually in triplicate were made. Living collections were shipped at frequent intervals to the American Embassy, Tokyo, and promptly air mailed to the Plant Germplasm Quarantine Center, Beltsville, Maryland, by the Agricultural Attache. At the same time, herbarium specimens temporarily dried were sent to the Tokyo University Botanic Garden at Koishikawa where the drying was completed. At the end of the trip, all herbarium specimens were boxed and sent by the Agricultural Attache to the National Arboretum.

Plants collected during the last week in Japan and the tissue cultures were hand carried to Washington with special quarantine authorization. These procedures resulted in an exceptionally high rate of success with vegetative propagations and excellent quality of dried herbarium specimens. This system resulted in all shipments of plants and herbarium materials arriving successfully at the National Arboretum. The effort to make meristem tissue cultures was surprisingly good and of 48 media vials used, 44 percent did not become contaminated.

We anticipate reporting on several species not previously introduced into cultivation, new information on the distribution range of previously-known species, and clarification of plant descriptions of several species for which our literature is at odds with Japanese information. Seeds of several species were collected for which introductions have probably not been made for several decades. In some instances seeds or plants representing the majority of species of generic groups (such as evergreen oaks and holly) native in Japan were obtained from different localities. These will be listed in tables in the final report. All collections were recorded in both plant exploration field note books and herbarium specimens in herbarium field books. The numbers were cross-referenced for future use.

The team experienced excellent field conditions in terms of availability of seed and excellence of weather. Rain fortunately occurred only on the days when we were on long-distance travel by van. As a result, the volume of collected material exceeded our estimates and extended the work day to 12 to 14 hours to permit the immediate documentation, preparation, and shipment of plant and herbarium collections.

In summary, the plant exploration to Japan followed our preliminary plan in exact detail. The results in terms of materials collected and new knowledge gained about the flora of Japan were outstanding. The demonstration of the advantages of a combined botanical/horticultural approach to plant collecting made an exceptional contribution to scientific biological field work. It should be noted that in this respect a team of less than three members would be hopelessly deficient. A major contribution to the success of the Japan exploration was the high degree of team work and energetic spirt of cooperation of the team members and their collaborators in Japan.

EDUCATION, PUBLIC SERVICES AND LIBRARY

A. Education and Information

Response to Public Queries. The Education Office answered 8,850 questions about plant problems, National Arboretum classes, horticultural events, and Arboretum collections. Because of the volume of inquiries, many plant information questions are now being referred to the Botanical Gardens, USDA specialists, and the area extension services where they have more adequate staff. Telephone calls accounted for approximately 4,500 inquiries and the remainder were divided between personal contact with Arboretum visitors and written correspondence. Written inquiries accounted for approximately 1,800 requests for information, while walk-in visitors accounted for the greatest increase in requests for information with a total of approximately 2,550.

Volunteer Guide Service. Twenty-two volunteer guides conducted 115 tours of the Arboretum during the past year. The volunteer guides under the supervision of the National Capital Area Federation of Garden Club's Volunteer Guide Chairman, Mrs. Judy French, held intensive guide training classes covering a wide range of topics. Plant society specialists and Arboretum staff members participated in the training sessions.

School groups and garden clubs accounted for nearly one-half of the above tours with the balance consisting of senior citizens, junior garden clubs, county extension tours, diplomatic wives, garden editors, college groups, miscellaneous professional groups, and others.

In addition to the tours handled by the volunteer guide service, 68 tours were conducted by members of the Arboretum staff.

Botanical Art Displays. The number of art displays has been reduced by changing from monthly exhibits to a 6- to 8-week format, thus saving staff time in scheduling, hanging, packaging, and shipping of the exhibits. The necessity of installing many of the exhibits on weekends for the convenience of the artist continues to be a problem. Thirteen exhibits of a botanical or horticultural nature representing a variety of media and subject matter were exhibited on the lobby walls and in a museum case in the Administration Building during the past year.

Arboretum Exhibits. The National Arboretum has provided the following special exhibits for display at various shows or functions:

An exhibit on Broadleaved Evergreens and one on the National Herb Garden - Annual Spring Flower Show, cosponsored by the Takoma Park Horticulture Club and Takoma Park Azalea Committee, Takoma Park Municipal Building, Takoma Park, Maryland.

National Herb Garden Exhibit - Metropolitan Horticulture Show, Montgomery Mall Shopping Center, Bethesda, Maryland, show cosponsored by Cooperative Extension Service of VPI and SU, University of Maryland, Washington Technical Institute, the Professional Grounds Management Society and the National Park Service.

The Flower Show - National Guard Armory, Washington, D.C. The National Arboretum received a first place award for its educational exhibit, "The Plants of Japan in American Gardens."

National Urban Forestry Conference - The National Arboretum provided an exhibit on Betula uber, the recently rediscovered Virginia Round Leaved Birch. The National Arboretum played a role in the discovery of this endangered species. An exhibit on the National Arboretum was also displayed at the conference held at the International Inn, Washington, D.C.

Popular Publications - Six Program Aids (PA) and USDA Home and Garden Bulletins (HG) were written, revised, and received new artwork during 1978. These publications are given a more contemporary feeling with new artwork as revisions and reprinting is done. PA 309, "The United States National Arboretum," and PA 1158, "The National Bonsai Collection," have had a series of photographs added to make them more attractive and informative.

The much delayed full color Agriculture Information Poster No. 1, "The National Arboretum," is now available. Two hundred thousand copies were printed and efforts are now underway to distribute the poster to plant societies, libraries, members of the Arboretum's mailing list, extension service offices, and other interested individuals and organizations.

Eighteen correspondence aids were prepared or revised for public distribution.

Radio-TV Talks and Workshops - Mr. Erik Neumann, Curator of Education, presented 16 programs for local and national radio and television. These included presentations on WGTS, the

Broadcast Service of Columbia Union College; American University's WAMU-FM; and USDA programs, "A Better Way" and "Consumer Time." Shows taped for USDA's programs are broadcast to over 80 television stations, 520 radio stations nationwide. He presented a 15-minute program on the National Bonsai Collection on the Lee Kinard Show of WFMY-TV, of Greensboro, North Carolina. This program was given at the request of the Washington Convention and Visitors Bureau and Station WFMY-TV.

Forty-seven talks or workshops were presented to groups varying from garden clubs, visiting Arboretum groups, high school and college classes, to educational specialists and press groups.

Special Projects - Mr. Neumann is involved in several Metropolitan Washington projects including the following:

The Widening Horizons Classroom and Field Demonstrations - The Arboretum's Education Office again participated in Widening Horizon's,a District of Columbia project to acquaint underprivileged youth with government activities and opportunities. Within each participating Federal agency, the program is hosted by wives of cabinet-level officials.

USDA Graduate School Committee on Field Studies and Horticulture - Serves on this committee as coordinator of the National Arboretum Horticulture Series. Responsibilities include selection of instructors, course content, and promotion of the program. Regularly attends USDA Graduate School Teacher/Learning Effectiveness Workshops held for Graduate School faculty and staff.

The following classes are now held on a regular basis at the Arboretum in the National Arboretum Horticulture Series and in the National History Field Studies Program in cooperation with the Audubon Naturalist Society:
--Basic Methods of Plant Propagation
--Indoor Light Gardening
--Plants in the Home
--Botany for Gardeners, Nature Lovers, and Photographs
--Introduction to Bonsai
--Introduction to Indoor Bonsai
--Herbs
--Vegetable Gardening
--Christmas Decorating with Plant Materials
--The Home Greenhouse

--Annuals, Perennials, Bulbs, and Roses
--Ornamental Woody Landscape Plants I, II, III
--The Care and Maintenance of Outdoor Plants
--Nature Photography
--Woody Plant Identification
--Spring-Flowering Identification
--Non-Flowering Plants
--Ferns and Fern Allies

The Adult Education classes are taught in a 3- to 10- session format, making use of classroom and greenhouse facilities at the Arboretum. Instructors include Arboretum staff members as well as specialists from local plant societies and the Extension Service.

National Arboretum Horticulture Classes - Three classes in bonsai given by Mr. Robert Drechsler, Curator of the National Bonsai Collection, and two classes on Landscape plant materials taught by Curator of Education, Erik Neumann, were offered this year to members on the National Arboretum mailing list. All classes were overwhelmingly received by the public. More requests for participation in the classes were received than could be accommodated.

Arboretum Classes for Children - In order to satisfy many requests for programs designed for children, a short course, Plant Identification for Children was given by Curator of Education, Erik Neumann. Due to the response and success of this effort, a second class for children, Plant Propagation for Children, will be offered in the summer of 1979.

Federation Horticulture School - Mr. Neumann served as an Advisor for the National Capital Area Federation of Garden Clubs, Inc., Horticulture School for Growers Exhibitors and Judges. He taught sessions on Groundcovers, Landscape Plants, and Dwarf Conifers in this year's Horticulture School.

National Junior Horticulture Association - Assisted in planning, and participated in the National Junior Horticultural Association (Maryland Division) Workshop held at the National Arboretum.

Plant Identification Workshop for Children with Hearing Impairment - Held a Plant Identification Workshop for Kendall Elementary School of Galudette College. Participants were students with hearing difficulties and the course had to be taught with the assistance of a sign interpreter.

Advisory Neighborhood Commission/D.C. - Participated in the Southwest/Southeast Advisory Neighborhood Commission (ANC 2D)

"Greenery/Neighborhood Beautification" Workshop at the Commissions Town Hall Meeting. Provided recommendations for the use of landscape plant materials in the District of Columbia. The Advisory Neighborhood Commission is funded by the District of Columbia. The Advisory Neighborhood Commission is a new nonpartisan neighborhood organization made up of locally elected representatives, called Commissioners, who serve without pay. The ANC's are a unique feature of the District's Home Rule and were approved by referendum by District voters in May 1974.

Chevy Chase Citizens Association - Presented information on recommended flowering trees and shrubs to the Chevy Chase Citizens Association. A slide lecture was given followed by an open discussion.

Public School - Programs on the National Arboretum were presented at the following public schools in the Washington area.

Mt. Vernon Community Center School - Mt. Vernon, Virginia.
Tucker Junior High - Riverdale, Maryland.
University College of the University of Maryland - Presented a program for an Upward Mobility class taken by USDA employees at the University of Maryland, University College.

Gifted Science Project of Montgomery County - Participated in the Gifted Science Project which is a federally-funded program under the Elementary Secondary Education Act, Title IV-C for the identification of resources for individual gifted science students and their teachers. The resources will be matched with objectives and topics in the Montgomery County Public Schools. They will include information on scientists, specific agencies and laboratories, print and nonprint materials and special activities such as science awards, competitions, and science fairs.

The resource bank will provide the individual gifted science student an opportunity for indepth exploration within areas of his/her interest, or aptitude. As a result existing science resources will be coordinated and made readily available to our individual gifted students and teachers. The project is planned for three years of funding; at the conclusion of the third year of the project, 1979-80, the material will be made available countrywide. Sample project materials will be prepared for dissemination to interested persons outside Montgomery County Public Schools. The project will be publicized statewide and nationally.

Meetings and Events. Regularly scheduled horticultural and botanical organization meetings held in the Arboretum auditorium;

The Botanical Society of Washington, National Capital Orchid Society, Indoor Light Gardening Society, Gloxinia and Gerneriad Society, Begonia Society, Washington Bonsai Club, and Orchid Judging Center meet on a monthly basis; Camellia Society of the Potomac Valley, Potomac Valley Chapter of the American Rhododendron Society, and Brookside Bonsai Club meet bimonthly; Washington Daffodil Society, Washington Daylily Club, and Potomac Lily Society meet quarterly; and the Potomac Valley Chapter of the American Rock Garden Society meets annually. The National Capital Area Federation of Garden Clubs, Inc., holds bimonthly meetings at the Arboretum, as well as various committee meetings throughout the year, including a Horticulture School and Landscape Critics Council.

Other special meetings and events held at the Arboretum: The District of Columbia Cooperative Extension Service's CORE training in fulfillment of EPA regulations, as well as other specialized workshops and examinations.

Wives of delegates to the NATO Summit Conference held a luncheon which was followed by a tour of the Arboretum.

Mrs. Bergland held a buffet luncheon for the #1 International Neighbors whose membership is composed of Ambassadorial, Congressional, and Cabinet Wives. Luncheon was followed by tour.

Flower Shows. The following plant societies held flower shows in the auditorium of the Administration Building: Indoor Light Gardening Society, Potomac Valley Camellia Society (fall show), Washington Daffodil Society, Potomac Bonsai Association, National Capital Daylily Club, National Capital Iris Club, and the National Capital Orchid Society, Potomac Valley Rhododendron Society, Potomac Lily Society. These flower shows play an important role in the Arboretum's educational program, and their attendance is overwhelming.

Tours, Horticultural Demonstrations, Films, and Nature Walks. In order to keep the public informed of events at the Arboretum, the Education Office issues an events newsletter listing nature walks, tours, horticultural and botanical films, special exhibits, horticulture demonstrations, and lectures held at the Arboretum. A separate listing of flower shows and art exhibits is now mailed to over 7,100 individuals who have requested notice of National Arboretum activities. These publications have been sent on a regular basis to the Washington Convention and Visitors Bureau, local newspapers, and radio and television stations for listing and for publicity purposes.

In compliance with Federal Regulations, a return postcard was sent to individuals on the Arboretum mailing list which must be returned in order to remain on our list. This should help remove individuals who do not wish to continue receiving announcements of Arboretum events.

Thirty-seven specialized tours, horticultural demonstrations, films, and nature walks were held during 1978 for the general public.

Eleven press releases were written and sent to the local media concerning publicity for Arboretum classes, flower shows, nature walks, special programs, and other events of interest to the public.

Special Items

Employee Health & Safety - The following films relating to employee health and safety were shown in the Administration Building auditorium to National Arboretum and Glenn Dale Employees.

1. Play It Safe With Power Tools
2. Techniques of Artificial Respiration
3. 28 Grams of Prevention
4. When Seconds Count
5. Knowing How To Drive Is Not Enough

Slide Collection - A concentrated effort continues to be made to photograph plant material commonly used in the landscape in order to assemble a comprehensive set of 35 mm slides to be copied and made available for teaching purposes to other institutions and individuals.

Youth Conservation Corps - Conducted tours of the Arboretum for Youth Conservation Corps members from Childrens Island, Washington, D.C., National Park Service, Harpers Ferry, West Virginia.

Maryland State Horticultural Day - Presented a workshop on landscape plant material for the Maryland State Horticulture Day Program held in Baltimore, Maryland.

Under a cooperative agreement with the NCAFGC, volunteer aids are provided to staff the Information and Activity Center. Daily instruction and orientation concerning collections, programs, and special events at the Arboretum is offered to the volunteers by Mrs. Mary Ann Jarvis, Education Office Assistant.

U.S. DEPARTMENT OF AGRICULTURE PUBLICATIONS

The following Program Aids (PA) and Home and Garden Bulletins (HG) were written, revised, received new art work or were reviewed and approved for reprinting without change by Erik A. Neumann.

--HG #192 - Transplanting Ornamental Trees and Shrubs
--HG # 86 - Growing Camellias
--HG #135 - Growing Flowering Crabapples
--HG #117 - Trees for Shade and Beauty
--PA #890 - Camellias at the National Arboretum
--AH #425 - Shade Trees for the Home

B. Library

Members of the Library Committee for 1978 were Chairman Erik A. Neumann, Frederick G. Meyer, Gene Eisenbeiss, William L. Ackerman, and ex-officio John L. Creech and Jayne T. MacLean. Delegates from the National Agricultural Library (NAL) were Deputy Director of Library Services, Wallace C. Olsen and Leila Moran, Chief of the Reference Branch, as alternate.

Collection Growth-Purchases. In 1978, a total of 102 books were ordered and received with money provided for acquisitions by NAL. For the period of January to December of 1978, $2,250 of the book budget allotted to us was utilized. After being carefully chosen by the Library Committee on the basis of being supportive of the research and education conducted at the National Arboretum, these books were ordered through NAL. They were then purchased and cataloged and forwarded by NAL, to the National Arboretum. Some representative titles received include: Herbs and Spices, Botanical Microtechnique and Cytochemistry, Hydroponic Gardening, Bonsai Techniques, Japanese Maples, and Plant Disease Handbook. Quite a number of works on floras were purchased including additional volumes to our set of Das Pflanzenreich.

Collection Growth-Gifts. As in the past, the library's gift book list was as complete as ever, owing to the generosity of many who have contributed their time, as in the case of speakers who have donated to the library the money they have earned for their lectures, as well as money donated by individuals and garden societies, and books, some old and rare. Special mention should be made of the contribution by Mrs. Judson French and the sizeable donation by James K. DeVore.

At the beginning of 1978, the balance of the library's Friends of the National Arboretum Account was $900. We closed out the year

with a balance of over $1,600. Approximately $1,540 were contributed to the library during the year, while $540 in expenditures were made. Our gift book lists issued are comprised of titles that are donated. Some of the titles purchased in this manner were Perry, Water Gardening, 1938; Clarkson, The Golden Age of Herbs and Herbalists, 1972. Other books donated include among their titles: Drake, Illustratines Florai Maris Pacifici, 1977; Suarés, The Illustrated Flower, 1977.

Serials. In 1978, as in previous years, periodical subscriptions were not included in NAL's book budget for the National Arboretum Library and thereby were bought with Arboretum funds. Of the approximate total of 230 subscriptions received, the cost of the 80 subscriptions purchased amounted to $2,800. The remaining subscriptions come to us via gifts or exchange. The library's issuance of "Contents of Current Periodicals" continues to help our users keep abreast of the pertinent periodical literature recently received.

Travel and Meetings. During the year, the librarian attended a number of activities, three of which were held locally and a fourth held in Kansas. The first one attended, "Information and Action Seminar" was cosponsored by the National Museum of Natural History and the Association of Systematic Collections, and was held at the Smithsonian Museum on April 7. On May 6, the Colloquium on John Claudius Loudon and the Early Nineteenth Century in Great Britain, taking place at the Dumbarton Oaks Center for Studies and Landscape Architecture in Washington, D.C., was a second event at which the librarian participated. The annual meeting of the Special Libraries Association took place in Kansas City, Kansas, from June 12 through June 15, and was a third activity Mrs. MacLean attended in a professional capacity. The "Orientation for Federal Librarians," October 23-25, 1978, cosponsored by the Library of Congress and the Federal Library Committee, held at the Library of Congress, rounded out the year as a fourth activity serving to broaden Mrs. MacLean's perspective on library service.

Services. All the traditional library services such as lending, reference, interlibrary loans (via NAL), computerized literature searches and numerous miscellaneous activities are provided by the Library of the Arboretum. Due to the usage statistics which the library maintains for NAL, we can quantitate and evaluate how much the collection is being used.

For the period covered, 1,247 readers came into the library. Of these 1,053 were Arboretum employees while the other 194 were visitors.

Over 520 requests for library items were made by Arboretum employees. Over 86 percent of these were filled within the library's collection. The remaining 14 percent were obtained via NAL. Of the total 690 reference questions directed to the library by incoming patrons, letters or telephone calls, 460 of these were asked by Arboretum staff, whereas the remaining 230 originated by non-staff.

The year found the library stabilizing from the major reclassification project which took place the previous year, as other ongoing projects continued throughout the year. Many housekeeping chores were caught up, when a regular student aid was employed for the summer.

As the latter half of 1978 approached, a major change in library personnel occurred. On September 1, Jayne MacLean accepted an appointment at NAL and from that time until the end of November, she found it necessary to divide her time equally between basic library duties at the Arboretum and her new assignments at NAL.

On November 20, Ann Juneau began her new appointment as librarian, leaving her position as assistant librarian of the Forest Service's Southern Forest Experiment Station in New Orleans. She began a transitional training period in which Mrs. MacLean visited with her one day a week for a period of one-and-one-half months for purposes of answering any questions involving routine matters, policies or procedures.

Finally, we wish to commend Mrs. MacLean for her outstanding efforts and achievements at the National Arboretum's Library during her five years here and extend our sincere wishes for her success and happiness at NAL.

ARBORETUM RESEARCH

A. Nomenclature and Taxonomy of Cultivated Plants (F.G. Meyer)

The National Arboretum Herbarium is world-wide in scope. Basically its objective includes collection of cultivated plants of the world, of interest to the Department of Agriculture and the broad spectrum of economic plants of interest to man. The National Arboretum Herbarium is the only facility of its kind within the Department of Agriculture, and is charged with serving the wide interests of agriculture in this country. The main content of the herbarium, which contains over 400,000 specimens, consists of ornamentals, weeds, agronomic, herbal, medicinal plants and their wild progenitors. The herbarium is a permanent and highly valuable asset because of the vast amount of documented material it contains as a basic resource for research and plant identification. Material in the herbarium is constantly in use and forms the basis of numerous National Arboretum based projects. Material is also loaned to other institutions for research use.

A long-range project initiated several years ago by Dr. F.G. Meyer concentrates on the documentation and identification of trees, shrubs, and woody vines of the southeastern United States -- from Maryland to the northern tier of Florida, west to eastern Texas, Arkansas, and Tennessee. The survey covers 13 or part of 13 states to document all of the various woody ornamental plants of this vast area, a task which is very laborious because of the size of the area. There is no precedent for the project, therefore the only source of specimens are those that we have collected ourselves. In the present project, collections are limited to plants found in nurseries, college campuses, cemeteries, gardens, parks, experiment stations, arboretums and botanic gardens, that is, wherever cultivated plants are grown. A publication based on this document material is anticipated, but this cannot be completed until it is reasonably certain that the inventory is complete. Collecting for the project has been limited for budgetary reasons which continue to persist from year to year. In spite of limited travel, a great amount of material has already been collected. In fact, to date over 5500 collections have been collected in all thirteen states except Arkansas.

The material is processed at the National Arboretum herbarium and then critically studied by comparison with authentic material and with the pertinent reference literature.

Field trips are planned to coincide with the flowering and/or fruiting time of the plants. Ideally, it is desirable to collect material in both flower and fruit, that is, in both spring and again in the summer or autumn. In 1978, over 300 additional collections were obtained from fourteen sites in Maryland, Virginia, District of Columbia, North Carolina, and South Carolina.

--North Carolina - Elizabethan Gardens, Manteo, Dare County.

The Elizabethan Gardens are small but superbly kept, and located on Roanoke Island. Climatically the gardens are ideally situated, being nearly surrounded by water near the sea in the northeastern part of North Carolina in the upper south in the camellia belt. The garden was begun in 1951 and is maintained by the Garden Club of North Carolina. The garden covers ten acres in a natural oak woodland with many live oaks and a fine oak allee. The garden contains an important collection of camellias, which were at their peak of flowering in early April. A particularly outstanding feature of the garden is the pleached allee of native yaupon (Ilex vomitoria) that encloses the formal garden and is clipped to a height of ten feet. Mitchella repens, the partidgeberry, is a native plant and is used extensively with considerable effect as a ground cover in many parts of the garden. Azaleas, mainly Southern Indicas, as well as Glenn Dales were also much in evidence. Documented collections from the garden included Berberis julianae, Rhaphiolepis umbellata, flowering almond (Prunus glandulosa) and Burford holly, (Ilex cornuta 'Burford'). Ilex crenata 'Convexa' is used in the formal garden as a clipped hedge. Other collections included laurustinus (Viburnum tinus) with bright blue fruit and Daphne odora, including both rose-pink and white-flowered forms. The Daphne looked particularly thrifty and showed no signs of the die-back that often debilitates this plant where it is grown farther south. A particularly fine specimen of yellow-fruited Ilex opaca in the garden was found originally in the wild near Cape Hattaras.

--Tryon Palace, New Bern, Craven County, North Carolina

The site of the first fixed colonial capitol and first state capitol of North Carolina. The present capitol and gardens have been more recently restored, the original capitol having burned in the 18th century. The modern restoration now reflects an outstanding example of a well manicured and superbly tended garden in the 18th century style. However, many of the plants are not of the 18th century vintage. None of the original plantings survived. However, there is a good collection of fine young trees and other colorful plants. The garden of spring bulbs, for example, is particularly effective in early April. Collections of documented plants made during the visit, included a pink-flowered silver-bell tree (Halesia carolina), quince, (Cydonia oblonga), Malus 'Hopa", red buckeye, (Aesculus pavia), Buxus harlandii, grecian laurel (Laurus nobilis), Ilex X 'Nellie R. Stevens', Osmanthus X fortunei, Chamaecyparis thyoides 'Ericoides', and Ilex 'Calina', the latter, a possible hybrid of Ilex cornuta and I. aquifolium that originated near New Bern through a local nurseryman. There is also a fine avenue of Darlington oaks near the main entrance.

--Orton Plantation, Brunswick County, North Carolina

This elegant old rice plantation bordering on the Cape Fear River dates from about 1725. The present garden, however, is a fairly recent addition, having been developed largely by the father of the present owner. The woodland garden covers about 20 acres and is largely devoted to broadleaved evergreen trees and shrubs, including many camellias and azaleas. An elegant avenue of live oaks parallels the river front by the house, swathed in Spanish moss, and many more are scattered throughout the garden. Also there are many azaleas, kurumes and Southern indicas in particular. A large Rosa banksiae, the double-yellow form, was particularly attractive on an old tree trunk. The rarest tree in the garden is Michelia compressa, an evergreen magnolia relative from Japan. Two specimens exist in the garden, one by the chapel and another in the garden itself. Orton is the only known source of this rare plant in the South. The present owner believes that his father introduced the plant from a nursery on the West coast. Some other collections made at Orton were horse sugar (Symplocos tinctoria), Bambusa multiplex, jessamine (Gelsemium sempervirens, and Xylosma congestum, of the Flacourtiaceae, which is a rare plant north of Florida. Other plants included Exochorda racemosa and Prunus mume, the latter out of flower.

--Washington, D.C. - U.S. Capitol Grounds.

During the spring and summer an attempt was made to document all of the trees and shrubs on the U.S. Capitol grounds, a task that previously had never been accomplished by anyone. In all, 331 collections were made. The collection is quite varied and interesting because of the size of some of the trees and the large number of memorial trees planted on the grounds. The oldest and largest specimens are English elms, Ulmus procera, which, unfortunately, are fast succumbing to the Dutch Elm Disease. The largest Dutch elm is just over five feet in diameter. In size, the collection on the Capitol grounds is exceeded only by the National Arboretum. An inventory of the trees on the Capitol grounds would be useful. The first inventory entitled "Trees of Washington, D.C.", by George B. Sudworth and B.E. Fernow, was published in 1891.

Fuchs Herbal Project (F.G. Meyer in collaboration with Dr. Emily Trueblood, Potomac Unit of the Herb Society of America). As co-author of the project, Dr. Meyer has provided all of the identifications for the 511 illustrations of plants included in the herbal, as well as text material related to these plants. The 16th century herbal "De Historia Stirpium" by Leonhart Fuchs, was published in

Basel, Switzerland in 1542. Fuchs was one of the three fathers of German botany along with Brunfels and Bock. The great herbal of Fuchs is unquestionably one of the landmarks of 16th century herbal literature. It is of particular interest to the history of botany and to medicine, because the illustrations were done from life. The plan is to publish a facsimile of the original 1542 Latin edition of Fuchs. A second volume is being prepared with information on (1) the identification of all 511 plant illustrations (contributed by F. G. Meyer) with their modern scientific names. The remaining chapters by Dr. Trueblood include (2) vernacular names of all 511 plants in eight languages, (3) ancient and modern uses of all 511 plants figured, (4) a life of Fuchs, and (5) bibliography of Fuchs writings. Botanically the book includes 46 non-European plants, including the following New World plants, pumpkin (Cucurbita pepo), common bean (Phaseolus vulgaris), French marigold (Tagetes patula), maize (Zea mays), and chili pepper (Capsicum annuum). These New World plants were figured and described in the Fuchs herbal for the first time anywhere. The first botanical glossary was also published in the herbal.

Ancient plants at Pompeii, Herculaneum, and the Roman Villas (F.G. Meyer in collaboration with Dr. Wilhelmina F. Jashemski, University of Maryland). The ancient cities and towns of Campania buried by Vesuvius in the famous eruption of 79 A.D. are unique and of importance because of the vast amount of information revealed by the numerous plant artifacts found in the excavations. Not the least important are carbonized remains of plants found in these sites, mainly food plants, about twenty-five in number, including emmer wheat, barley, chick pea, lentil, pine nut, onion, hazel nuts, walnuts, cherry, grapes, bitter vetch, fig and olive. From these materials Scanning Electron Microscope (SEM) photographs have been prepared for use in a publication on these ancient plants. These materials represent a unique record of crop diversity of the ancient crops growing in southern Italy at the beginning of the Christian era.

Prunus (Ornamental Cherries) (R.M. Jefferson) Propogation material from seven taxa not in the United States was acquired from Roy Lancaster, Hillier Arboretum, Ampfield, England. These taxa are: P. (canescens X serrula), P. kurilensis cv. Ruby, P. serrulata cv. Autumn Glory, P. X yedoensis cv. Tsubame, P. hyb. cv. Hilling's Weeping , P. hyb. cv. Pink Shell and P. (incisa X speciosa) cv. Snow Goose. They are in quarantine for virus indexing at the Plant Quarantine Facility, USPIS Glenn Dale, Md. At a later date, they will be evaluated for ornamental performances in the Washington, D.C. area, photographed, morphologically described and documented by herbarium vouchers.

Of the twelve original Japanese flowering cherry selections sent by the people of Tokyo, Japan in 1912, to First Lady, Mrs. Howard Taft, for planting in Potomac Park, Washington, D.C., only two, P. serrulata cv. Kwanzan and P. X yedoensis cv. Somei-yoshino, are extant. The others died years ago, and have not been replaced. All but P. serrulata cv. Shirayuki, of the 1912 cherry taxa that once grew in Potomac Park, have been located in various United States collections. Material from these plants is being propagated at the USPIS Glenn Dale, Maryland, with the hope of again establishing these cherries in the Washington, D.C. area and possibly Potomac Park.

Propagation material was collected from most of the ornamental cherry selections at the Glenn Dale Station in order to preserve the germplasm of these historically significant trees, many of which were established through the work of David Fairchild, Paul Russell and other early 20th century scientists. Noteworthy among the trees being propagated are P. serrulata cvs. Gyoiko and Tai-haku, both brought into the United States in 1915 by Frank N. Meyer from the famous Arakawa collection near Tokyo, Japan. These plants are the last of 54 other named selections, that like the 1912 Potomac Park cherry trees, were presented by the municipality of Tokyo to the American government. Also, important among the Glenn Dale cherry selections being propagated are two ornamental cherries introduced into cultivation by the world famous authority on these trees, Captain Collingwood Ingram of England. These selections, P. hyb. cv. Kursar and P. serrulata cv. Imose, were sent to the station in 1954 by Capt. Ingram and are possibly nowhere else in the United States.

In an effort to provide the Washington, D.C., area with authenticated ornamental cherry taxa, budwood is being propagated from trees in several of the major U.S. collections. After this material is established, and when possible, its identity verified and documented, it will be planted on the Arboretum grounds. Twelve virus-free taxa from the Irrigation Agricultural Research and Extension Center, Prosser, Washington, are among these taxa, and like the others, they are grafted on virus-free P. mahaleb stock.

The process of collecting documentary data of ornamental cherry taxa is continuing. However, it is now felt that a published list of cherry accessions from the 400+ source locations on file at the National Arboretum would be impractical at this time, since the identity of most of these trees has not been substantiated, and thus misnamed taxa could not be distributed. This information will be made available upon request to any serious cherry researchers.

Malus (ornamental crabapples)(R.M. Jefferson) Malus halliana (R.M.J. 174) and M. hyb. (R.M.J. 102), two disease resistant selections mentioned in the 1977 Annual Report were distributed to National Arboretum plant evaluation cooperators.

Sixty, two-year old plants of National Arboretum introduction Malus sieboldii cv. Fuji were donated to the National Capital Park Service for planting along the river in Anacostia Park and other Park Service sites throughout the Washington D.C. area. In an effort to improve the Fall beauty of the N.A. Crabapple Collection, Mr. Jefferson spent a week at The Morton Arboretum Crabapple Collection (the largest in the United States) listing the better fruiting taxa. Budwood from 84 highly ornamental fruiting crabapples selected by him at Morton is being propagated for future performance evaluation in the Washington, D.C. area. Twenty crabapple selections propagated from budwood were sent from the USDA Experimental Station, Cheyenne, Wyoming and were planted on the Arboretum grounds.

Ilex (holly) project (T.R. Dudley and G.K. Eisenbeiss). Nomenclature and Taxonomy of Cultivated taxa of Ilex, including cultivars, is a continuing project. Part I of the International Checklist of Cultivated Ilex, which deals with the documentation of all epithets in Ilex crenata, is nearing completion. The checklists of the other cultivated species and hybrids of Ilex and their cultivars are also being collated and prepared. The nomenclatural and taxonomic confusion between Ilex ciliospinosa and I. centro-chinensis has been investigated thoroughly and will result shortly in a published article. The final study of the "Nummularia Group" of Ilex crenata has been completed. In conjunction with the International Registration Authority for Cultivated Ilex, the International Registration Committee, comprised of G.K. Eisenbeiss and T.R. Dudley, have registered and published five new cultivars pertaining to I. opaca, I. decidua, I. serrata X I. verticillata, and I. (ciliospinosa) X (aquifolium X pernyi). A taxonomic revision of the taxa of Ilex indigenous to Ecuador is under way, and will be published as a section of the Flora of Ecuador being edited and published in Sweden. An account of the "Aquifoliaceae" on the Caribbean Island of Dominica was completed and will be published in the Flora of Dominica. A taxonomic revision of Ilex native in Bulgaria is in progress and is significant because of widely distinct population of I. colchica and I. spinigera. This revision of Ilex will be published in the new Flora of Bulgaria being prepared and edited in Sofia. A full taxonomic and nomenclatural study of the species of Ilex native and cultivated in the southeastern United States, particularly the poorly understood and confused deciduous taxa, is under way. The treatment will include keys, descriptions, and nomenclatural notes of value. With the collaboration with Dr. P. Baas, a

plant anatomist from the Netherlands, affinities between species of the Aquifoliaceae are being investigated and evaluated. These anatomical studies are of particular significance in interpreting the "true" biological status of the deciduous taxa of the U.S.

Viburnum (T.R. Dudley). Taxonomy and nomenclatural studies of this genus is a continuing project. A taxonomic and nomenclatural revision of Viburnum indigenous to Ecuador is under way, and will ultimately be published as a section of the Flora of Ecuador being edited and published in Sweden. A comparative study of naturally occurring populations of Viburnum X hillieri in the People's Republic of China, and those that have occurred under cultivated circumstances is continuing.

Flora of Staten Island, Argentina (T.R. Dudley). "A Contribution to the Flora and Vegetation of Isla de los Estados (Staten Island), Tierra del Fuego, Argentina" has been accepted for publication by the American Geophysical Union, and will appear as a book in 1979, as vol.30 of the Antarctic Research Series: Terrestrial Biology. This monographic manuscript of nearly 500 typed pages will contain over 40 illustrations (photographs and line-drawings) and is notable as the very first flora and vegetation analysis of the remote sub-antarctic island - Isla de los Estados. Of further significance is that the book will contain an extensive Bibliography of over 3000 references pertinent to the floristic elements, ecology, geology, and phytogeography of Tierra del Fuego, Patagonia and the Sub-Antarctic regions. A second, condensed summary paper entitled: Florula Isla de los Estados, Argentina, has been prepared for publication in the leading Argentine botanical-taxonomic journal, Darwiniana. A third, strictly taxonomic-nomenclatural paper is under preparation to validate and document the several new taxa and new rank combinations that resulted from the indepth floristic survey and analysis of collections.

Rhododendron (T.R. Dudley). The taxonomy and nomenclature of R. eriocarpum and R. tamurae is under critical investigation. These Japanese species have been variously confused as synonyms or varieties of each other, of R. indicum or of R. simsii. In all probability R. eriocarpum and R. tamurae are conspecific. The identity of these plants is for the elucidation of the origin of the "Satsuki Hybrid Group" of Japanese azaleas, of which R. eriocarpum has been designated one of the parent species.

Cruciferae - particularly Alyssum (T.R. Dudley). The physiological hyperaccumulation ability of the heavy metal nickel by the genus

Alyssum was investigated in depth on a world-wide basis in cooperation with New Zealand scientists, and this unusual phenomenon in the plant kingdom appears to be restricted to only one section of the genus, Sect. Odontarrhena. This research resulted in the synoptic paper "Hyperaccumulation of Nickel by Alyssum Linnaeus (Cruciferae)". The chemo-taxonomic feature of nickel hyperaccumulation correlated with integrated morphological characters allows A. sepyllifolium subsp. lusitanicum to be described as a new nickelophilous species, Alyssum pintodasilvae, from Portugal. Two other genera, Bornmuellera and Peltaria, have been confirmed as being hyperaccumulators of nickel. A taxonomic and nomenclatural revision of the genus Alyssum for Bulgaria is also being undertaken with Dr. Mincho Anchev of the Bulgarian Academy of Sciences, to be published in the Flora of Bulgaria. This Revision will stress for the first time a comparative analysis of trichome types through micro-photographic techniques, such as SEM. Other Herbarium Research (T.R. Dudley). A paper, "Zoellnera-A New Amaryllid Genus from Chile" will be submitted for publication in 1979, either in Rhodora or Plant Life.

Over 60 taxa new to science have been described by various botanists from the Peruvian collections of 1968 and 1969, about twenty-five bearing the specific name "dudleyi" for Dr. T. R. Dudley.

Dr. F. G. Meyer is consultant for taxonomy and nomenclature for the family Valerianaceae for BIOTA of North America Flora Project, scheduled for 1979 publication. Likewise, Dr. Dudley will contribute families Aquifoliaceae and Caprifoliaceae to the same project. Dr. Meyer continues as a member of the U.S.D.A. Committee on Biological Control.

Dr. Meyer is actively working on the identification of nearly 750 collections of plants made on a joint National Arboretum-National Geographic Society plant exploration expedition to Japan during October-November, 1978.

Mr. Mazzeo continues, to a limited extent, on a study of Betula uber, the thought-to-be extinct Virginia round-leaf birch, rediscovered in southwestern Virginia in 1975. Three trips were made to the B. uber site to gather more data and material for documentation and study of this unusual birch population, now limited to 12 trees. Mr. Mazzeo is preparing an up-to-date list of the plants growing in the Fern Valley. Major progress this past year was made in producing a tentative list of the Pteridophytes now growing there, and what additional taxa should be represented in the collection. Long-range plans call for studies of the Spermatophyte taxa to be cataloged, as well.

Research Field Trips (Dr. T.R. Dudley and Mr. G.K. Eisenbeiss)

a. In April 1978, a three-week botanical collecting trip was conducted by T.R. Dudley and G.K. Eisenbeiss along the coastal plain of the S.E. United States from Maryland, including the Eastern Shore (Delmarva Peninsula) through Virginia, North Carolina, South Carolina, Georgia, Florida to the Gulf Coast states of Alabama, Mississippi and Louisiana. The objective of this exploration was to locate, analyze and document with flowering herbarium material the 15 species of native Ilex as they occur in undisturbed natural populations and habitats. Of particular significance was the documentation of the deciduous species which have been notoriously confused, taxonomically and nomenclaturally, for many decades. During this trip over 400 separate numbers were collected at 126 different sites. Rare species collected included: I. longpipes, I. bushwellii, I. curtisii, I. cuhbertii, I. beadlei and I. cumulicola as completely new records for these species. Detailed observations were also made on the incidence of two very injurious insect pests to holly - Holly Leaf Miner and the Holly Berry Midge. It was especially significant that these two pests were evident on many species in the wild, other than I. opaca.

b. In November 1978, a ten-day collecting trip was conducted by T.R. Dudley and G.K. Eisenbeiss for the same objectives as detailed above under (a.). However, native species of Ilex on this trip was concentrated entirely in southern Virginia, North Carolina, and South Carolina. The November trip yielded 162 separate numbers collected from 200 different sites. Ilex laevigata and a very morphologically anomolous "I. ambigua" were significant, as well as a very fine documentation of immense plants of previously unrecorded populations of I. amelanchier.

From field observations it is obvious that the number of natural sites of native species of Ilex is declining in the southeastern United States due to expanding population pressures and increased development and clearing of woodlands for agricultural purposes, notably pulp wood plantations. It is also very clear from field observations and examination of the resulting collections that the insect pests Holly Leaf Miner and Holly Berry Midge are much more prevalent in the wild and occur on many more species of Ilex than had ever been previously suspected or reported.

Herbarium (P.M. Mazzeo and J.R. McClammer, Curators)

The Mackay Nut Collection was curated and incorporated into the main herbarium collection along with other fruit and/or bulky materials

(roots, stems, etc.). Now all of this material is readily available in systematic order within the herbarium.

Much of the above cited progress was accomplished with the aid of Mr. James U. McClammer. In addition to helping with the above, he has continued to collect and document the living plant collections on the National Arboretum grounds. During the past year he documented all of the Buxus and Hemerocallis collections, and made major progress in documentation of the Magnolia and Hibiscus collections. This includes the collecting, pressing and drying of the specimens, preparing typed labels, and making the material into sets, one for deposit in the National Arboretum herbarium and the duplicates for later use in the exchange program with other herbaria. Approximately 1500 specimens are included.

The up-dating of nomenclature on extant herbarium specimens and the identification/verification of nearly 500 miscellaneous plant specimens sent to the Arboretum by the general public continues. Approximately two thousand specimens of woody ornamentals from the Southeastern U.S. have been determined as a part of the on-going project to prepare a manual to the identification of woody ornamental plants of the Southeastern U.S. headed by Dr. Meyer.

Major accessions received during the year (sixty (60) accessions representing 8,964 specimens) included 767 cancer vouchers (collected by botanists at the Medicinal Plant Resources Lab, Beltsville) 2,360 specimens of indigenous Japanese plants collected by Mr. Furuse, a Japanese amateur botanist; 978 specimens of Avena (wheat) cultivars from Canada; nearly 1,000 specimens collected by various U.S.D.A. botanists at installations other than the National Arboretum (including nearly 500 specimens of Vicia (vetch) representing research of Dr. C.R. Gunn, Beltsville) and more than 450 specimens of cultivated Hawaiian plants (including duplicates) as a gift from Mr. W. Bush of Honolulu.

During the past reporting period the plant mounting department consisted of one full-time plant mounter, two YACC plant mounters and three part-time students (1040-hour appointments who each spend an average of 4 to 8 hours per week - or full-time during vacation or break times - mounting plants.) In spite of the limited amount of full-time mounting help, a record number of 12,983 specimens were mounted in 1978. A volunteer spent some time working with the Isaac C. Martindale Collection - she is a member of the Martindale family. With good progress made on reducing the back-log of "regular" material to be mounted, an effort is now under way to spend more time on remounting the remaining Martindale collection for inclusion into the regular Arboretum herbarium.

The data in the foregoing report are summarized in the following statistical report:

HERBARIUM STATISTICAL REPORT

Herbarium Material Received	1977	1978
Number of accessions of herbarium specimens received from institutions and individuals	65	60
Number of Specimens Received:		
As EXCHANGE	3,081	2,753
As PURCHASE	1,309	2,580
As GIFT (including Staff Coll.)	6,145	3,631
TOTAL Number of Specimens Received	10,535	8,964

Herbarium Specimens Sent

Number of Specimens Sent:		
As EXCHANGE	609	4,014
As GIFT (including specimens for ID)	536	28
TOTAL Number of Specimens Sent	1,145	4,042

Specimens have been received from or sent to more than 35 institutions in the following countries: Argentina, Australia, Austria, Canada, England, Iran, Israel, Japan, Netherlands, New Zealand, Rhodesia, South Africa, Taiwan, USA and the USSR.

Herbarium Material Borrowed (Loans)	1977	1978
Number of loans sent to other institutions	21	45
Number of herbarium specimens sent, on loan to other institutions	2,754	3,941
Number of loans borrowed from other institutions	7	53
Number of herbarium specimens borrowed from other institutions	459	2,010

CONTENT OF THE HERBARIUM

	1977	1978
Number of Specimens Mounted and Added to the Permanent Collection:		
Regular Material	10,193	12,983
Martindale Material	0	0
Total material added to collection:	10,193	12,983
Number of Specimens in Permanent Collection	412,892	425,875
Number of herbarium specimens added to TYPE Collection	39	0
Number of herbarium specimens deposited in TYPE Collection	1,652	1,652
Miscellaneous Identifications (sent via public,etc.)	485	484
Number of visitors in Herbarium	72	54
Number of plant collections made: McClammer and Mazzeo		1,700
Number of plant collections made: Meyer		1,800
Number of plant collections made: Dudley & Eisenbeiss		1,600

B. Cytogenetics, Breeding, and Evaluation of Landscape Trees
Inheritance of Wound Compartmentalization (F. S. Santamour, Jr.)

All landscape trees are subject to wounding--from a wide variety of causes. Wounds lead to wood discoloration and decay, which may kill the tree or weaken it so that it is a hazard to man. Trees respond to wounding by walling off (compartmentalizing) the injured area and preventing the further spread of discoloration and decay. Some trees are strong compartmentalizers, and some trees are weak compartmentalizers. We now have solid evidence that wound compartmentalization is under genetic control. In 1978, we cut down and analyzed 135 pedigreed maple trees (red, silver, and hybrids) that had been wounded in 1974. There was variation in compartmentalization between species, parent trees, and progenies. The way is now open to incorporate wound compartmentalization (injury "resistance") into all of our selection and breeding programs for the development of superior landscape trees. This trait may be among the most important for long-term survival under stressful urban conditions.

Betula. The U.S. Forest Service closed out their birch genetics project in Rhinelander, Wisconsin, in 1978. We were fortunate to obtain a number of special collections and new hybrids for inclusion in our test plots in Beltsville. The first seed crop was harvested from our Japanese white birch seed orchard, and this superior seed will be distributed to cooperating nurserymen in 1979. Hybridization studies with B. luminifera were continued in 1978.

Fraxinus. A provenance test of green ash (F. pennsylvanica) was established at Shady Acres. Seedlings from 48 different geographic locations in the United States and Canada were planted according to a statistical design. Greenhouse tests on seedlings indicated a high tolerance of flooding in all seed sources, but some variation in salt tolerance. Trials of Verticillium-wilt resistance were inconclusive. These test plots will determine the climatic adaptability of various seed sources in this area and will also be available for other research. Isozyme studies on several provenances indicated considerable regional and local variation in peroxidase.

Biochemical studies on flavonoids and coumarin compounds have been completed for several species and indicate that chemical criteria will be useful in determining hybridity in many interspecific combinations.

Ilex. Four new cultivars resulting from breeding research -- 'September Gem', 'Clusterberry', 'Apollo', and 'Sparkleberry' -- were released to the nursery trade. Another cultivar, 'Nakada,' Japanese holly, was described as a result of intensive taxonomic and cultural research. Research on holly leaf miner has shown that many

species in addition to I. opaca are subject to feeding damage. Hybrid populations bred for resistance to one species of leaf miner seem to be subject to severe damage by another, normally less populous, species of miner. Several of the advanced generation hybrids involving I. opaca and I. aquifolium did, however, exhibit high miner resistance, and will be tested further.

Magnolia. New interspecific hybrids were outplanted to permanent test locations. Stock blocks of selected trees were established at Glenn Dale. A hybrid between M. liliflora and M. sprengeri 'Diva' was placed on Stock Increase preparatory to introduction. This late-flowering, red-flowered selection will be the first tree-type magnolia released by the project.

Pinus. Crosses were made between "non-crystallizing" (trees whose resin does not contain strobic acid) parents of Pinus strobus and P. griffithii. Seedlings from these crosses have the potential to resist attacks of the white-pine weevil and will be tested in New England.

Platanus. A stock block for continual cutting production of the four selected anthracnose-resistant clones was established at Glenn Dale.

Quercus. Approximately 150 hybrid oaks were planted out in test plots at Shady Acres. These trees are second-generation hybrids derived from F_1 crosses made by Dr. Walter Cottam in Salt Lake City, Utah. Dr. Santamour has supervised the nationwide distribution and testing of this material since 1976, and this is the first year for large-scale outplanting of these trees. Many of the more promising hybrids involve Quercus turbinella, a small-leaved, evergreen, drought-resistant species from the southern Rockies.

Robinia. Seed (ca. 12,000) from our "seed orchard" of select clones was distributed for testing in Kentucky, Pennsylvania, Tennessee, New Zealand, and Korea.

Ulmus. The Arboretum has entered into a cooperative testing project with the National Capital Region of the U.S. Park Service. In 1978, we delivered 200 plants of five of our disease-resistant hybrids and selections to a Connecticut nursery. This nursery, under contract with the Park Service, will grow these and other trees to outplanting size and deliver them to the Park Service for planting in the Washington area. This cooperation will allow a more thorough testing of Arboretum productions under various urban site conditions.

The Himalayan small-leaved elm (Ulmus villosa) has been tested for resistance to Dutch elm disease. This species, one of the few still surviving species at Kew Gardens in England. Of the three clones inoculated with "aggressive" and "nonaggressive" strains of DED, two showed sufficient resistance to warrant further introduction and breeding research.

A new disease-resistant hybrid elm has been selected for evaluation testing and possible introduction. This is a 3-species, 3-nation hybrid involving the American slippery elm (U. rubra), the Siberian elm (U. pumila), and the Chinese elm (U. parvifolia). Growth and form potential are excellent.

Special Items

Mr. Eisenbeiss, along with Dr. Dudley, made two collecting trips for native Ilex in the southeastern United States. For more details, see Dudley's report under "Nomenclature and Taxonomy of Cultivated Plants."

The First National Urban Forestry Conference, sponsored by the U.S. Forest Service, was held in Washington, D.C., November 12-16, 1978. Dr. Santamour served on the Planning Committee and presented an invited paper. More than 500 persons, representing the entire range of Urban Forestry interests, attended this conference.

On September 11-12, 1978, the American Society of Consulting Arborists and the Association of Landscape Tree Appraisers held their first "Tree Valuation" workshop at the Arboretum. More than 80 arborists, horticulturists, and landscape architects from the United States and Canada spent two days learning the techniques and developing the judgment necessary to assess the dollar value of landscape trees for tax and legal purposes. Mr. Eisenbeiss and Dr. Santamour hosted this workshop and participated in all the phases of planning. The success of the workshop will lead to similar programs in other geographic zones of the United States.

Dr. Santamour served on the Northeastern Region Research Steering Committee, whose purpose was to review regional, federal, state, and private research in nursery, florist, and turf crops and make recommendations for the future directions of these programs.

C. Cytogenetics, Breeding, and Evaluation of Ornamental Shrubs (D. R. Egolf)

Abelia

Abelia is a small to medium-sized, summer flowering shrub that is a major nursery grown plant used extensively in the more temperate climates. At present, only several cultivars are available that have similar growth habits and flowers, and are restricted by hardiness limitations. The genus includes some 25 species with a range of flower, foliage, and growth habits, and hardiness zones. To date, 12 Abelia accessions have been acquired as germplasm for hybridization. The hybridization objectives will be hardiness, evergreen foliage, extension of flower color and size, and compact growth habits.

Lagerstroemia

Due to extended high temperature periods during the summer, Lagerstroemia flowering was abundant. From advanced generation seedling populations, 82 additional selections were made for test planting. The 1,600 previously selected second and third generation seedlings were space planted for further evaluation for mildew, flower, and trunk bark characteristics. These seedling selections include both tree and shrub types that have more intense flower colors and a wide diversity of growth habits. An additional 11 accessions, which include seed and cuttings from India and China, were obtained for evaluation. The Lagerstroemia Handbook/Checklist, which enumerates all cultivars with descriptive notes, a brief history, and cultural notes, was published by the American Association of Botanical Gardens and Arboreta. Three cultivars have been stock increased and named for introduction in 1979 and 1980.

Malus

The fire blight resistant plants isolated by artificial inoculation have made excellent growth, and many flowered and fruited profusely for the first time. Sixteen selections were made for further evaluation and to be used as parental stock for hybridization After another season's observation selected plants will be propagated for field testing at other sites by cooperators.

Pyracantha

'Mohave', which was introduced in 1972, has now become a leading cultivar both in the United States and abroad. This cultivar frequently has been illustrated by color photographs in nursery catalogs and has been noted in numerous garden columns, feature articles, and horticultural literature. Although 'Mohave' has been propagated in quantity for 8 years, it is only now becoming readily available in retail garden outlets.

Two additional cultivars, 'Navaho' and 'Teton', were introduced. At time of release by cooperators, more than 134,000 plants of these two cultivars had been propagated.

'Navaho' is the first F_2 hybrid seedling selection to combine three species, P. angustifolia, P. coccinea, and P. crenulata. The low, dense branching plant in 12 years has grown only to a height of 6 feet and a breadth of 8 feet. The semi-evergreen, narrow, dark green leaves are densely clustered on short twigs. The luminescent orange-red fruit ripens in November and persists throughout most of the winter. The plant is scab and fire blight resistant and has been hardy to Zone 7b. This is the most spectacular, compact, heavy fruited Pyracantha developed to date.

'Teton' is a seedling selection of P. coccinea and P. crenulata that has a distinct upright growth habit. The original 12-year-old plant has maintained the vertical growth habit and has attained a height of 14 feet and width of only 10 feet. This growth habit is tailored for container production and also for screen and barrier plantings. The foliage is a medium green and semi-persistent. The fruit which ripens in mid-October to a light yellow and matures to a medium yellow-orange persists until January. The plant is scab and fire blight resistant and has been hardy to Zone 6b.

Syringa

The Syringa germplasm collection was increased by 274 accessions acquired from the major Syringa collections and includes material from Canada, Korea, Japan, and Yugoslavia. From 72 crosses made in 1977 that produced seed, 1,725 seedlings have been obtained which have made excellent growth; but these will not be of flowering size for another year. The hybridization of S. oblata with select S. x hyacinthiflora and S. vulgaris cultivars was pursued with 433 attempted crosses. Of these, seed was harvested from 117. The stock plants made excellent growth and have initiated heavy bud set that will enable expansion of hybridization during the spring season.

Viburnum

Viburnum plicatum var. tomentosum 'Shasta' has been named and introduced. This is a seedling selection that produced abundant, large inflorescences with sterile marginal florets that are pure white and a third larger than other cultivars. The growth habit is strongly horizontal with a mature size of 6 feet high and 12 feet wide. The plant is spectacular with masses of white inflorescences in May, abundant scarlet fruit in late July and August, and intense plum-colored foliage for an extended period in autumn. The cultivar is hardy to Zone 5.

Two selections of the V. carlesii flower type, with glossy foliage and compact growth habits, have been propagated for stock increase distribution.

Cooperative Program

From the combined efforts of the evaluation and stock increase cooperative programs, the new cultivars are successfully being introduced. During the year, these programs have expedited the introduction of 4 Ilex, 2 Pyracantha, and one Viburnum cultivar. In 1978, 1,468 plants of 4 selections (1 Camellia, 1 Hibiscus, 1 Lagerstroemia, and 1 Magnolia) were distributed to 16 stock increase cooperators; and 532 plants of 7 selections (3 Lagerstroemia, 1 Magnolia, 2 Pyracantha, and 1 Viburnum) were distributed to 28 domestic and foreign cooperators for evaluation.

D. Breeding and Cytogenetics of Woody and Herbaceous Ornamentals (W. L. Ackerman)

Camellia

During the 1977-78 season, 2,534 controlled crosses were made following objectives toward floral fragrance, greater cold hardiness and new plant and flower forms. This resulted in 371 new hybrid seedlings. With the 1978-79 season approximately 75 percent completed, 1,753 controlled crosses have been made with no estimate as yet regarding capsule development.

A backcross hybrid C. japonica 'Kramers Supreme' X C. hybrid 'Fragrant Pink Improved' has been under evaluation for four years and out on stock increase for two years. During 1978, it was registered with the American Camellia Society under the name 'Ack-Scent', and with the Germplasm Resources Laboratory under PI 430519. Flowers of 'Ack-Scent' are peony form, 4-1/4" across, 2" deep (ungibbed), 18 petals, 16 petaloids, shell pink, deep spicy fragrance, floriferous, blooms hold well and shed from plant at senescence. Further distribution of plants and scions is anticipated during the 1979 season to Camellia Nurserymen.

A number of other promising fragrant flowered crosses involving 'Fragrant Pink Improved' and other fragrant breeding parents have been under evaluation and hopefully several of these will be sent out for stock increase.

The winter seasons of 1976-77 and 1977-78 were the worst experienced at the National Arboretum in the 30-year history of the Arboretum's camellia collection. Most severely injured were the C. sasanqua cultivars which were reduced from over 200 specimens to

little more than a dozen plants in the main collection. Plants 25-years old and up to 10-feet in height were killed to the ground, while others were so severely injured they were unacceptable for public display and had to be removed. Dr. Creech has estimated that plant replacement to return the collection to its former condition would cost about $200,000.

Nonetheless, some good has come from all this devastation. A large specimen of C. oleifera (PI 162475) situated in the C. sasanqua planting area and several hundred C. oleifera seedlings along its lower edge showed no injury. Hybrids of C. oleifera with C. sasanqua and C. hiemalis planted in an even more exposed area nearby during the spring of 1977 have likewise shown no winter injury to date.

Although C. oleifera has attractive growth habit, foliage, and bark characteristics, the flowers have no commercial value. Among 26 C. oleifera hybrids, produced from crosses made in 1969, vegetative characteristics strongly resemble C. oleifera, but flower characteristics display size, form, and quality comparable to many C. sasanqua cultivars in a color range of white, pink, lavender and red, in solid and variegated patterns. Major emphasis was given during the 1978-79 season to extend the utilization of C. oleifera as a breeding parent in a wide range of crosses including: (1) C. oleifera with the most cold hardy of C. sasanqua and C. hiemalis cultivars, (2) backcross the best of the 1969 C. oleifera hybrids with C. oleifera, C. sasanqua, and C. hiemalis, and (3) sib cross various 1969 hybrids among themselves. At the present time, over 300 seed capsules are developing from this group of crosses.

Considerable interest has been expressed by officials of the American Camellia Society and camellia growers in the deep south for camellias with greater heat and sun tolerance. Propagations of a series of interspecific hybrids involving C. miyagii, C. hongkongensis C. granthamiana and C. kissi, all introduced from tropical and subtropical Asia, have been distributed for testing to seven cooperators in southern Florida.

Interest in prostrate and low growing camellia hybrids has been expressed by the director of Brookside Gardens, Maryland, and members of the American Rock Garden Society. A group of 68 camellia hybrids possessing desirable characteristics have been transferred to Brookside Gardens, where they will be propagated and distributed for trial by Rock Garden Society members. Full credit will be given to the Arboretums for elite types developed through this arrangement.

An anther culture experiment was performed using a Murashige and Skoog medium supplemented with coconut milk. Both agar-solidified and liquid media were used. Anthers were kept alive for 4 to 6 weeks, but no further development was observed.

Franklinia - Franklinia seedlings treated with colchicine continue to be stunted and display distorted and mosaic leaf patterns for the third season. Poor development has hindered satisfactory cytological examination.

Stewartia - During the summer of 1978, 229 controlled crosses were made between Stewartia ovata and Franklinia alatamaha and 208 controlled crosses were made between Stewartia ovata and Camellia japonica 'Kuto tsubaki'. A .1 percent gibberillic acid and 1 percent e amino cuproic acid mixture in lanolin paste was used in conjunction with all pollinations. Fifteen seed capsules containing 25 seeds were harvested from the Stewartia X Franklinia crosses, but none from the Stewartia X 'Kuro tsubaki' crosses. Our past experience in germinating intergeneric crosses involving these species is not good. It is hoped that we may have better success this time.

Iris kaempferi

Flower descriptions were completed during the summer of 1978 on the 315 F_2 progeny resulting in the selection of a dozen clones having special merit and scheduled for further evaluation. Descriptions were also made on approximately 95 percent of 2,400 F_3 progeny planted in the new (D-5) test block in 1977. By far, this has been the most rewarding group thus far studied by virtue of greater flower size, substance, variations in color patterns and number of double form flowers having six or more petals. Among this group were 325 progeny which had been treated with colchicine at the early germination stage. A number of these are showing plant and flower characteristics typical of polyploid forms. Also a new color form (cobalt blue), not previously observed in any of our progeny was discovered among the colchicine treated F_3 populations.

Six plants resulting from controlled crosses between Japanese and German Iris were studied cytologically. Root tip chromosomes counts disclosed that two of these have extra chromosomes (2n=26 and 28 respectively) from the normal count of 2n=24 expected for Iris kaempferi. Further study will be necessary to determine the true nature of these individuals.

During the summer of 1978, 402 controlled crosses were made among the F_3 progeny selections especially those showing phenotypic characteristics typical of polyploid forms. A total of 178 seed capsules were harvested from these crosses. Representative seed lots were sown and plants grown for future evaluation. In addition, 325 controlled crosses were made between predominately white flowered forms of Iris kaempferi with yellow and red flowered form of German bearded Iris. A total of 18 seed capsules were harvested, and all seeds from this group were sown resulting in 189 progeny. Although

many of these very young seedlings appear to have phenotypic characteristics similar to Iris kaempferi there are approximately 5 to 10 percent which look intermediate in character. These will be grown out, investigated cytologically, and evaluated for flower characteristics.

Tissue culture experiments were performed using various plant parts as explant sources. A modified Murashige and Skoog medium was used, with napthalene acetic acid (NAA) and N_6 benzyl adenine (BA) added. Explant sources used were meristem areas, pedicel slices, ovary slices, and leaf bases. Shoot production was obtained on only one explant, an ovary section. Shoot multiplication is now underway.

Amaryllidaceae

Lycoris

Of the seedlings resulting from the 1977 crossing season, 153 survived and are being grown on to flowering. All but two of these have been examined cytologically, and chromosome counts have been made. Chromosome counts have proven valuable in establishing the hybridity of seedlings, as many species have distinct chromosome numbers or types which may be distinguished in the offspring.

By means of variations from accepted cultural techniques, efforts have been made to push the seedlings to flowering in less than the 6 to 10 years reported by other workers. While it is too early to permit any firm conclusions to be drawn, the growth observed in the first year has greatly exceeded that in other reports.

The goal of the Lycoris breeding program is the development of an increased range of flower colors in hardy types. Hardiness in Lycoris is associated with species which produce leaves in the spring; the less hardy types produce autumn foliage which is borne through winter. The data accumulated thus far indicates that the spring-leaved character is recessive. It is estimated that about 15 percent of the 1977 seedlings will be spring-leaved forms. About 66 percent of the remaining seedlings will carry genes for the spring-leaved character, and will be used for backcrosses to spring-leaved types.

During the 1978 season, 686 crosses were made, resulting in 53 seeds, of which 38 have germinated to date. The reason for the low percentage of seed set is that a large number of crosses were made on three sterile species (L. albiflora, L. incarnata, and L. squamigera) following the receipt of a report of seed set on L. squamigera by another worker. Of the sterile types, seed was produced only on L. albiflora. Two capsules were produced, yielding one seed each. One of these seeds has germinated.

Several 1978 seedings were treated with colchicine to induce polyploidy. It is still too early to assess results of the treatment, but no seedlings were lost.

It is estimated that about 45 percent of the 1978 seedlings will be spring-leaved, and nearly all of the remaining plants will carry genes for this character.

Tissue culture experiments have been carried out with the sterile species L. albiflora, L. incarnata, and L. squamigera. A successful procedure for propagating L. albiflora from leaf sections has been developed; and bulblets have been induced on pedicel sections of L. squamigera. Tissue culture-produced bulblets of L. albiflora have been treated with colchicine in vitro in an attempt to produce a fertile polyploid form of this species. It is too early to evaluate the success of this experiment.

Other Amaryllids

Cytological work with several genera has resulted in chromosome counts for Paramongaia weberbaueri, Hippeastrum nelsonii, and Hippeastrum starkii. An examination of Pamianthe peruviana, a close relative of Paramongaia, is underway for a comparison of the two genera.

Data is being collected on flower characteristics of the clones of Paramongaia in the collection. The more desirable types have been crossed.

Descriptions are being made on interspecific Hippeastrum hybrids as they come into flower. Selections are being made for types which show resistance to infection by Stagonospora, a fungus to which most commercial cultivars are quite susceptible.

Several plants which are the result of intergeneric crosses made three years ago are approaching flowering size. A flower bud has appeared on one of these, a Hippeastrum-Crinum cross.

Several seedlings of a cross between Hippeastrum rutilum and the commercial hybrid 'White Dazzler' flowered in 1978. These seedlings are unusual in that each umbel contains five to eight flowers, as compared to the four normally produced on Hippeastrum hybrids. This character prolongs the flowering period.

A collection of Zephyranthes species and other closely related genera is being made for future breeding work. Accessions which have potential for winter hardiness in this area are being planted outside for evaluation.

Rhododendron - japonicum

Sib-and self-pollinations were made of two breeding lines (a red-flowered and a yellow-flowered line) which resulted in 514 F_4 progeny now under greenhouse culture. These will be grown to flowering to ascertain whether we finally have developed true-breeding lines of these selections.

Pyrus calleryana

Requests from nurserymen for propagational materials of P. calleryana 'Whitehouse' has resulted in the distribution of approximately 500 scions to 22 nurserymen during 1978. A second narrow columnar type quite distinct from 'Whitehouse' in having much larger leaves, larger flowers and more upright vertical branching has been under evaluation since 1969 and shows promise for release and distribution. Six other preliminary selections have not proven themselves as sufficiently worthwhile or unique and will be destroyed during the 1979 season. No further Pyrus propagations or selections are anticipated. Thus, the Pyrus project will be closed out during 1979, with further work limited to the propagation and distribution of 'Whitehouse' and possibly the second columnar form mentioned.

Malus

A series of controlled crosses made in 1964-65, evaluated during the past years for fruit and tree characteristics was finally terminated in 1978. This project is now restricted to the continued evaluation of one unnamed flowering crab selection, distributed in 1977 for cooperator testing. No other selections are now under evaluation or contemplated.

Hypericum, Potentilla and Yacca

Documented collections have been assembled for future breeding and evaluation programs involving these genera. From various seed accessions received, representative lots were propagated, some of these were field planted for trial while other, more slow growing forms, remain in the greenhouses. First flowering on Hypericum and Potentilla accessions were observed during the 1978 season.

Plant Introduction Station, Glenn Dale, Maryland (H. Waterworth)

Several hundred plant introductions were received, established, propagated to large numbers, inspected and/or tested for all manner of insects, eggs, and disease agents during 1978. Many arrived as a result of SEA-AR collection trips to Eastern Europe and to Central and South America. They include 266 pears, 78 bulb items, 80 potatoes, 45 camellias, 47 other deciduous fruits, and 83 miscellaneous grasses, ornamentals, brambles, etc. Also established was material to be part of the medicinal plants program.

Distributions of germplasm from Glenn Dale included 800 scions and 95 plants of pome fruits on 53 orders; 740 scions of the new 'Whitehouse' ornamental pear on 21 orders; 324 bulbs on 20 orders; 213 scions or plants of camellias on 19 orders; 472 plants or cuttings of other woody ornamentals on 23 orders; 180 plants of coffee, 219 of potato, 18 of sweet potato on 10 orders, 177 seed or plant items of medicinal crops on 36 orders, and about 50 miscallaneous distributions of older germplasm from the several repositories.

Glenn Dale also cooperated with the National Arboretum during 1978 in propagating about one-third of the plants for their annual ornamental distribution. Genera grown were: Fraxinus (500 plants), Clethra (400), Populus (120), Pinus (360), Euonymus (120), Larix (100), and miscellaneous species. We are also maintaining about 500 plants of Taxus, Cephalotaxis, Paulownia, 100 foliage plants, 200 herb-garden plants and 500 lantana bedding plants. We propagated about 500 plants of 100 ornamental Prunus varieties for the National Arboretum.

Indexing tests for latent viruses were performed on 30 woody and herbaceous ornamental introductions by mechanical transmission to herbaceous indicators, or by electron microscopy. Virus was detected in peperomia, stenomesson, amaryllis, and orchids. Virus was also detected in 10 of 211 grass introductions, 21 of 45 potatoes, 10 of 16 pome fruits, 21 of 50 grapes, and in 5 of 90 miscellaneous items. The viruses were identified in about 80 percent of the cases. All virus-free items were distributed within the U.S.A. to one or more scientists. Infected P.I.'s were either released with some restrictions, or destroyed, or undergoing heat therapy to eliminate the virus, depending on its importance, quarantine regulations, and policy. About 180 new three-year tests were begun this year on recent introductions of the above genera.

Research programs include those performed in the field on pome fruit viruses during the summer and those on other viruses performed in the greenhouse during the winter season.

In the field, the long range studies on variability in symptoms caused by cultures of two apple viruses continue. At the moment, we do not know which viruses cause which diseases in some varieties of apples. Other field experiments deal with our search for resistance to virus infection, evaluation of new cultivars as virus sensitive indicators, etiology of 2 pear viruses (PLV and Red vein), and effects of antibiotics on two apple diseases of unknown cause.

In the greenhouse we have isolated, purified, and produced antiserum in rabbits to a virus from potatoes from the USSR. It was identified as Cabbage black ring virus. Much effort was spent on a virus from Peperomia and identified as cucumber mosaic, on a virus from aspen which may be a cucumovirus and on trying to purify a latent virus from pear but without much success. Some effort was made to characterize a virus from a Brazilian dahlia P.I. and from a South American Stenomesson P.I. This effort continues.

Our primary research effort has been on a new phenomenon in plant virology - an infectious ribonucleic acid that is associated with but not part of cucumber mosaic virus. Some very significant observations were made during 1978--primarily that this RNA is able to regulate disease expression in several important crops. This RNA is produced only when CMV is in the plant with it. In some crops, it permits the CMV to kill the crop (tomato). CMV alone does not ordinarily kill tomatoes. In other cases, it protects the crop from the usual disease that CMV causes, and we see essentially healthy plants resulting (tabasco pepper). We now know that this CARNA 5 decreases or increases the usual affects of CMV in several other crops--cucumber, pumpkin, corn, lima beans, etc.

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